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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/874,004	04/30/2013	Stephen Harrison	102555-1054581

CONFIRMATION NO. 8025

POA ACCEPTANCE LETTER



OC00000095924279

23370
KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 PEACHTREE STREET
SUITE 2800
ATLANTA, GA 30309

Date Mailed: 12/07/2017

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/04/2017.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/nbekele/



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/874,004	04/30/2013	Stephen Harrison	10001108.0097

CONFIRMATION NO. 8025

POWER OF ATTORNEY NOTICE



24392
FISH IP LAW, LLP
2603 Main Street
Suite 1000
Irvine, CA 92614

Date Mailed: 12/07/2017

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/04/2017.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/nbekele/



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
13/874,004	04/30/2013	1756	1260	102555-1054581	21	5

CONFIRMATION NO. 8025

REPLACEMENT FILING RECEIPT



0000000093924294

23370
KILPATRICK TOWNSEND & STOCKTON LLP
Mailstop: IP Docketing - 22
1100 PEACHTREE STREET
SUITE 2800
ATLANTA, GA 30309

Date Mailed: 12/07/2017

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Stephen Harrison, Benicia, CA;
Samaresh Mohanta, San Diego, CA;

Applicant(s)

Alger Alternative Energy, LLC, Indianapolis, IN

Assignment For Published Patent Application

Simbol Inc., Pleasanton, CA

Power of Attorney: The patent practitioners associated with Customer Number 23370

Domestic Priority data as claimed by applicant

This application is a CON of 12/880,924 09/13/2010 PAT 8454816
which claims benefit of 61/241,479 09/11/2009 *

(*)Data provided by applicant is not consistent with PTO records.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 05/29/2013

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/874,004**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

Selective Recovery of Manganese and Zinc From Geothermal Brines

Preliminary Class

205

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA/82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	13/874,004
Filing Date	04-30-2013
First Named Inventor	Stephen Harrison
Title	Selective Recovery of Manganese and Zinc From Geothermal Brines
Art Unit	1756
Examiner Name	PHASGE, ARUN S
Attorney Docket Number	102555-1054581

SIGNATURE of Applicant or Patent Practitioner

Signature	/Chrystal A. Tomblyn/	Date (Optional)	12/1/17
Name	Chrystal A. Tomblyn	Registration Number	76,327
Title (if Applicant is a juristic entity)	Attorney for Applicant		
Applicant Name (if Applicant is a juristic entity)	Alger Alternative Energy, LLC		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐

*Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☒ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:

23370

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☒ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name

Address

City

State

Zip

Country

Telephone

Email

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Alger Alternative Energy, LLC

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature

Stephen Harrison

Date (Optional)

July 13, 2016

Name

Stephen Harrison

Title

Chief Technology Officer, Alger Alternative Energy, LLC

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	076465-000097 102555-1054581
	Application Number	13/874,004
Title of Invention Selective Recovery of Manganese and Zinc From Geothermal Brines		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>		

Secrecy Order 37 CFR 5.2

<input type="checkbox"/> Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--

Inventor Information:

Inventor 1 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Stephen		Harrison	
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Benida	State/Province	CA	Country of Residence US
Mailing Address of Inventor:				
Address 1		134 Panorama Dr.		
Address 2				
City	Benida	State/Province	CA	
Postal Code	94510	Country i	US	
Inventor 2 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Samaresh		Mohanta	
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	San Diego	State/Province	CA	Country of Residence US
Mailing Address of Inventor:				
Address 1		11462 Fortino Point		
Address 2				
City	San Diego	State/Province	CA	
Postal Code	92131	Country i	US	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add				

Correspondence Information:

<p>Enter either Customer Number or complete the Correspondence Information section below.</p> <p>For further information see 37 CFR 1.33(a).</p>
--

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	076165-000007 102555-1054581
		Application Number	13/874,004
Title of Invention	Selective Recovery of Manganese and Zinc From Geothermal Brines		

☐ An Address is being provided for the correspondence information of this application.

Customer Number	35970 23370
Email Address	docteking@bglp.com ipdefiling@kilpatricktownsend.com <input type="button" value="Add Email"/> <input type="button" value="Remove Email"/>

Application Information:

Title of the Invention	Selective Recovery of Manganese and Zinc From Geothermal Brines		
Attorney Docket Number	076165-000007 102555-1054581	Small Entity Status Claimed	<input checked="" type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

Publication Information:
☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not be** the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	35970 23370		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status	Pending	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	12880924	2010-09-13
Prior Application Status	Expired	<input type="button" value="Remove"/>	

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	076166.0000097 <u>102555-1054581</u>
		Application Number	13/874,004
Title of Invention	Selective Recovery of Manganese and Zinc From Geothermal Brines		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12880924	non provisional of	61241479	
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)¹ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country ¹	Filing Date (YYYY-MM-DD)	Access Code ¹ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	076165.000097 <u>102555-1054581</u>
		Application Number	13/874,004
Title of Invention	Selective Recovery of Manganese and Zinc From Geothermal Brines		

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

<input checked="" type="radio"/> Assignee	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Joint Inventor
<input type="radio"/> Person to whom the inventor is obligated to assign.	<input type="radio"/> Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name Simbol Inc. Alger Algernative Energy, LLC

Mailing Address Information For Applicant:

Address 1		6920 Kell Center Parkway <u>5405 Jackson Street</u>	
Address 2		Suite 243	
City	Pleasanton <u>Indianapolis</u>	State/Province	GA <u>IN</u>
Country	US	Postal Code	94566 <u>46241</u>
Phone Number		Fax Number	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	076166.000097 <u>102555-1054581</u>
	Application Number	13/874,004
Title of Invention Selective Recovery of Manganese and Zinc From Geothermal Brines		

Email Address	
Additional Applicant Data may be generated within this form by selecting the Add button.	

Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1				
Complete this section only if non-applicant assignee information is desired to be included on the patent application publication in accordance with 37 CFR 1.215(b). Do not include in this section an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest), as the patent application publication will include the name of the applicant(s).				
If the Assignee is an Organization check here. <input type="checkbox"/>				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee Data may be generated within this form by selecting the Add button.				

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.				
Signature	/Chrystal A. Tomblyn/		Date (YYYY-MM-DD)	2017-12-01
First Name	Chrystal A.	Last Name	Tomblyn	Registration Number
76,327				
Additional Signature may be generated within this form by selecting the Add button.				

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	076165.000097 <u>102555-1054581</u>
		Application Number	13/874,004
Title of Invention	Selective Recovery of Manganese and Zinc From Geothermal Brines		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Electronic Acknowledgement Receipt

EFS ID:	31117395
Application Number:	13874004
International Application Number:	
Confirmation Number:	8025
Title of Invention:	Selective Recovery of Manganese and Zinc From Geothermal Brines
First Named Inventor/Applicant Name:	Stephen Harrison
Customer Number:	24392
Filer:	Chrystal A. Tomblyn/Myrla Hernandez
Filer Authorized By:	Chrystal A. Tomblyn
Attorney Docket Number:	10001108.0097
Receipt Date:	04-DEC-2017
Filing Date:	30-APR-2013
Time Stamp:	14:23:40
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73	13874004_373c_Statement.pdf	86534 b4ccd85726ea22d7ec43b3076effa0b7a3a4d7f3	no	3

Warnings:

ESM / PETITIONER EX 1002_14

Information:					
2	Power of Attorney	13874004_POA.pdf	187206	no	2
			937896ffc1da01ffca788302bf68a2a346edc cb2		
Warnings:					
Information:					
3	Application Data Sheet	13874004_ADS.pdf	744114	no	6
			4f4961d7de50572ddb48c64a431859fbd3 a220c		
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
Total Files Size (in bytes):			1017854		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: Alger Alternative Energy, LLCApplication No./Patent No.: 13/874,004 / 9,057,117 Filed/Issue Date: 04-30-2013 / 06-16-2015Titled: Selective Recovery of Manganese and Zinc From Geothermal BrinesAlger Alternative Energy, LLC, a Limited Liability Company

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.
- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Harrison et al. To: Symbol Inc.The document was recorded in the United States Patent and Trademark Office at
Reel 031426, Frame 0133, or for which a copy thereof is attached.2. From: Symbol Inc. To: Alger Alternative Energy, LLCThe document was recorded in the United States Patent and Trademark Office at
Reel 043117, Frame 0923, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Chrystal A. Tomblyn/

12/1/17

Signature

Date

Chrystal A. Tomblyn

76,327

Printed or Typed Name

Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/874,004	06/16/2015	9057117	10001108.0097	8025

24392 7590 05/27/2015
FISH & TSANG LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 182 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Stephen Harrison, Benicia, CA;
Samaresh Mohanta, San Diego, CA;
SIMBOL INC., Pleasanton, CA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

24392 7590 04/15/2015
FISH & TSANG LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Marutzzella Castro	(Depositor's name)
/Marutzzella Castro/	(Signature)
May 10, 2015	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/874,004	04/30/2013	Stephen Harrison	10001108.0097	8025

TITLE OF INVENTION: Selective Recovery of Manganese and Zinc From Geothermal Brines

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$0	\$480	07/15/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHASGE, ARUN S	1756	205-540000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.</p>	<p>2. For printing on the patent front page, list</p> <p>(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,</p> <p>(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.</p>	<p>1 <u>Fish & Tsang, LLP</u></p> <p>2 _____</p> <p>3 _____</p>
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3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Simbol, Inc.

Pleasanton, CA

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
- ☒ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 500341 (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Martin Fessenmaier/

Date May 10, 2015

Typed or printed name Martin Fessenmaier

Registration No. 46697

Electronic Patent Application Fee Transmittal

Application Number:	13874004			
Filing Date:	30-Apr-2013			
Title of Invention:	Selective Recovery of Manganese and Zinc From Geothermal Brines			
First Named Inventor/Applicant Name:	Stephen Harrison			
Filer:	Martin Fessenmaier/Marutzzella Castro			
Attorney Docket Number:	10001108.0097			
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Utility Appl Issue Fee	1501	1	960	960
Publ. Fee- Early, Voluntary, or Normal	1504	1	0	0
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				960

Electronic Acknowledgement Receipt

EFS ID:	22301117
Application Number:	13874004
International Application Number:	
Confirmation Number:	8025
Title of Invention:	Selective Recovery of Manganese and Zinc From Geothermal Brines
First Named Inventor/Applicant Name:	Stephen Harrison
Customer Number:	24392
Filer:	Martin Fessenmaier/Marutzzella Castro
Filer Authorized By:	Martin Fessenmaier
Attorney Docket Number:	10001108.0097
Receipt Date:	11-MAY-2015
Filing Date:	30-APR-2013
Time Stamp:	01:46:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	PTOL-85.pdf	96181 553df421a83c26f5b6353d5676178377de052645	no	1

Warnings:

Information:

ESM / PETITIONER EX 1002_23

2	Fee Worksheet (SB06)	fee-info.pdf	32435	no	2
			601bfd0f340a25869f82dfe46208f302b6546a9f		
Warnings:					
Information:					
Total Files Size (in bytes):			128616		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

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24392 7590 04/15/2015
FISH & TSANG LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

Certificate of Mailing or Transmission

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Marutzzella Castro	(Depositor's name)
/Marutzzella Castro/	(Signature)
May 10, 2015	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/874,004	04/30/2013	Stephen Harrison	10001108.0097	8025

TITLE OF INVENTION: Selective Recovery of Manganese and Zinc From Geothermal Brines

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$0	\$480	07/15/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHASGE, ARUN S	1756	205-540000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.</p>	<p>2. For printing on the patent front page, list</p> <p>(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,</p> <p>(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.</p> <p>1 <u>Fish & Tsang, LLP</u></p> <p>2 _____</p> <p>3 _____</p>
---	--

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(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Simbol, Inc.

Pleasanton, CA

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
- ☒ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 500341 (enclose an extra copy of this form).

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NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Martin Fessenmaier/

Date May 10, 2015

Typed or printed name Martin Fessenmaier

Registration No. 46697

Electronic Patent Application Fee Transmittal

Application Number:	13874004			
Filing Date:	30-Apr-2013			
Title of Invention:	Selective Recovery of Manganese and Zinc From Geothermal Brines			
First Named Inventor/Applicant Name:	Stephen Harrison			
Filer:	Martin Fessenmaier/Marutzzella Castro			
Attorney Docket Number:	10001108.0097			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Utility Appl Issue Fee	2501	1	480	480
Publ. Fee- Early, Voluntary, or Normal	1504	1	0	0
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				480

Electronic Acknowledgement Receipt

EFS ID:	22301119
Application Number:	13874004
International Application Number:	
Confirmation Number:	8025
Title of Invention:	Selective Recovery of Manganese and Zinc From Geothermal Brines
First Named Inventor/Applicant Name:	Stephen Harrison
Customer Number:	24392
Filer:	Martin Fessenmaier/Marutzzella Castro
Filer Authorized By:	Martin Fessenmaier
Attorney Docket Number:	10001108.0097
Receipt Date:	11-MAY-2015
Filing Date:	30-APR-2013
Time Stamp:	01:49:40
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$480
RAM confirmation Number	7355
Deposit Account	500341
Authorized User	CASTRO, MARUTZZELLA

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

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Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and examination processing fees)

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Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	PTOL-85.pdf	96181	no	1
			553df421a83c26f5b6353d5676178377de052645		

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	32274	no	2
			29a4b832b6732f792d5ac118847b536898f0d8dd		

Warnings:

Information:

Total Files Size (in bytes):	128455
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

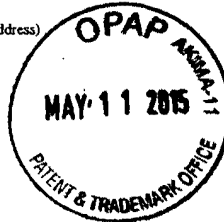
PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE
 Commissioner for Patents
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
 or **Fax** (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

24392 7590 04/15/2015
 FISH & TSANG LLP
 ROBERT D. FISH
 2603 Main Street
 Suite 1000
 Irvine, CA 92614-6232



Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
 I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Marutzzella Castro	(Depositor's name)
/Marutzzella Castro/	(Signature)
May 10, 2015	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/874.004	04/30/2013	Stephen Harrison	10001108.0097	8025

TITLE OF INVENTION: Selective Recovery of Manganese and Zinc From Geothermal Brines

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$0	\$480	07/15/2015

05/11/2015 INTEFSW 00007355 13874004

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHASGE, ARUN S	1756	205-540000

01 FC:2501 480.00 DA

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list

- (1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
 (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Fish & Tsang, LLP

2

3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

Simbol, Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Pleasanton, CA

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
☒ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 500341 (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
☐ Applicant asserting small entity status. See 37 CFR 1.27
☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Martin Fessenmaier/

Date May 10, 2015

Typed or printed name Martin Fessenmaier

Registration No. 46697



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

24392 7590 04/15/2015
FISH & TSANG LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

EXAMINER

PHASGE, ARUN S

ART UNIT

PAPER NUMBER

1756

DATE MAILED: 04/15/2015

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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13/874,004

04/30/2013

Stephen Harrison

10001108.0097

8025

TITLE OF INVENTION: Selective Recovery of Manganese and Zinc From Geothermal Brines

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$0	\$480	07/15/2015

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

24392 7590 04/15/2015
FISH & TSANG LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/874,004	04/30/2013	Stephen Harrison	10001108.0097	8025

TITLE OF INVENTION: Selective Recovery of Manganese and Zinc From Geothermal Brines

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0	\$0	\$480	07/15/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHASGE, ARUN S	1756	205-540000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363). <input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached. <input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.	2. For printing on the patent front page, list (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____ (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____ 3 _____
---	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
☐ Applicant asserting small entity status. See 37 CFR 1.27
☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/874,004	04/30/2013	Stephen Harrison	10001108.0097	8025

24392 7590 04/15/2015
FISH & TSANG LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

EXAMINER

PHASGE, ARUN S

ART UNIT	PAPER NUMBER
----------	--------------

1756

DATE MAILED: 04/15/2015

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 13/874,004	Applicant(s) HARRISON ET AL.	
	Examiner ARUN S. PHASGE	Art Unit 1756	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to terminal disclaimers filed 3/27/15.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are 21-41. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some *c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Examiner's Amendment/Comment |
| 2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>8/15/13 (corrected)</u> | 6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 7. <input type="checkbox"/> Other _____. |
| 4. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. | |

The present application is being examined under the pre-AIA first to invent provisions.

REASONS FOR ALLOWANCE

The following is an examiner's statement of reasons for allowance: It is proper when the only rejection outstanding is an obvious type double patenting, to allow the first application while requiring the filing of the terminal disclaimer for the second application. Accordingly, the claims are allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ARUN S. PHASGE whose telephone number is (571)272-1345. The examiner can normally be reached on MONDAY-THURSDAY, 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith D. Hendricks can be reached on (571) 272-1401. The fax phone


Art Unit: 1756

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ARUN S PHASGE/
Primary Examiner, Art Unit 1756

asp

Search Notes 	Application/Control No. 13874004	Applicant(s)/Patent Under Reexamination HARRISON ET AL.
	Examiner ARUN S PHASGE	Art Unit 1756

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
205	539, 540, 573, 602-608	12/21/14	asp

SEARCH NOTES		
Search Notes	Date	Examiner
WEST his attached	12/22/14	asp
inventor name searched in eDAN	12/22/14	asp
WEST his attached	4/6/15	asp

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
WEST his	attached	4/6/15	asp

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13874004
	Filing Date		2013-04-30
	First Named Inventor	HARRISON, S.	
	Art Unit	1736 1756	
	Examiner Name	N/A	
	Attorney Docket Number	076165.000097	

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
/A.P./	1	4016075		1977-04-05	Wilkins	
↓	2	4116856		1978-09-26	Lee et al.	
↓	3	4159311		1979-06-26	Lee et al.	
↓	4	4221767		1980-09-09	Lee et al.	
↓	5	4291001		1981-09-22	Repsher et al.	
↓	6	4347327		1982-08-31	Lee et al.	
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↓	8	4348296		1982-09-07	Bauman, et al.	
/A.P./						

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	13874004
Filing Date	2013-04-30
First Named Inventor	HARRISON, S.
Art Unit	1736
Examiner Name	N/A
Attorney Docket Number	076165.000097

/A.P./	9	4348297		1982-09-07	Bauman, et al.	
↑	10	4376100		1983-03-08	Lee et al.	
↑	11	4430311		1984-02-07	Lee et al.	
↑	12	4461714		1984-07-24	Burba, III	
↑	13	4472362		1984-09-18	Burba, III	
↑	14	4540509		1985-09-10	Burba, III	
↑	15	4727167		1988-02-23	Burba, III, et al.	
↑	16	5135652		1992-08-04	Boateng	
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↑	18	5389349		1995-02-14	Bauman et al.	
↑	19	5599516		1997-02-04	Bauman et al.	
/A.P./						

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

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First Named Inventor	HARRISON, S.	
Art Unit	1736	
Examiner Name	N/A	
Attorney Docket Number	076165.000097	

/A.P./	20	6017500		2000-01-25	Mehta	
/A.P./	21	6280693		2001-08-28	Bauman et al.	
/A.P./	22	6458184		2002-10-01	Featherstone	
/A.P./	23	6555078		2003-04-29	Mehta	
/A.P./	24	6682644		2004-01-27	Feathersone et al.	
/A.P./	25	8454816		2013-06-04	Harrison et al.	

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
/A.P./	1	20010000597	A1	2001-05-03	Featherstone	
/A.P./	2	20030226761	A1	2003-12-11	Featherstone et al.	

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FOREIGN PATENT DOCUMENTS

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		13874004
Filing Date		2013-04-30
First Named Inventor	HARRISON, S.	
Art Unit	1736	
Examiner Name	N/A	
Attorney Docket Number	076165.000097	

Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²ⁱ	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1							<input type="checkbox"/>


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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
/A.P./	1	COLE, et al., "Zinc Solvent Extraction in the Process Industries," 24(2) Mineral Proc. & Extractive Metallurgy Rev, 2003, pp. 91-137	<input type="checkbox"/>
/A.P./	2	DREISINGER et al., "New Developments in the Boleo Copper-Cobalt-Zinc-Manganese Project," available at http://bajamining.com/_resources/Reports/alta_paper_2006_boleo_final.pdf (2006)	<input type="checkbox"/>
/A.P./	3	GOTFRYD, et al., "Recovery of Zinc(II) from Acidic Sulfate Solutions, Simulation of Counter-Current Extraction Stripping Process," 38 Physicochemical Problems of Mineral Processing, 2004, pp. 113-120	<input type="checkbox"/>
/A.P./	4	KAWAI, et al., "Solvent extraction of zinc(II) and manganese(II) with 5,10,15,20-tetraphenyl-21H, 23H-porphine(TPP) through the metal exchange reaction of lead(II)-TPP," 7 Solvent Extr. Res. Dev. Japan 2000, pp. 36-43	<input type="checkbox"/>
/A.P./	5	LEE, et al., "Solvent Extraction of Zinc from Strong Hydrochloric Acid Solution with Alamine 336," 30(7) Bull, Korean chem. Soc. 2009, pp. 1526-1530	<input type="checkbox"/>
/A.P./	6	Co-pending application USSN 13/539,106, filed June 29, 2012	<input type="checkbox"/>
			<input type="checkbox"/>

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	13874004
Filing Date	2013-04-30
First Named Inventor	HARRISON, S.
Art Unit	1736
Examiner Name	N/A
Attorney Docket Number	076165.000097

			
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EXAMINER SIGNATURE

Examiner Signature	/Arun Phasge/	Date Considered	12/22/2014
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	13874004
Filing Date	2013-04-30
First Named Inventor	HARRISON, S.
Art Unit	1736
Examiner Name	N/A
Attorney Docket Number	076165.000097

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

- ☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

- ☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

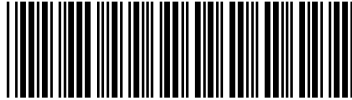
- ☐ See attached certification statement.
- ☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- ☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.


Signature	<i>Karthika</i>	Date (YYYY-MM-DD)	2013-08-15
Name/Print	Karthika Perumal	Registration Number	69,296

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

<i>Index of Claims</i> 	Application/Control No. 13874004	Applicant(s)/Patent Under Reexamination HARRISON ET AL.
	Examiner ARUN S PHASGE	Art Unit 1756

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

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	36	✓	=						

<i>Index of Claims</i> 	Application/Control No. 13874004	Applicant(s)/Patent Under Reexamination HARRISON ET AL.
	Examiner ARUN S PHASGE	Art Unit 1756

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant				<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47	
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	37	✓	=						
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	41	✓	=						

WEST Search History for Application 13874004

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Select	Query	Database	Operator	Plurals	Thesaurus	Date
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Prior Art						
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ESM / PETITIONER EX 1002_47


<input type="checkbox"/>	(manganese or mn and (zinc or zn)) and silica	PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDSD, FPRS	OR	YES		12-23-2014
<input type="checkbox"/>	(manganese or mn and (zinc or zn) and silica) and brine	PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDSD, FPRS	OR	YES		12-23-2014
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Issue Classification 	Application/Control No. 13874004	Applicant(s)/Patent Under Reexamination HARRISON ET AL.	
	Examiner ARUN S PHASGE	Art Unit 1756	

CPC						
Symbol					Type	Version
C22B		19	/	00	F	2013-01-01
C25C		1	/	16	I	2013-01-01
C25C		1	/	10	I	2013-01-01
C22B		47	/	00	I	2013-01-01
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CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

NONE		Total Claims Allowed:	
		21	
(Assistant Examiner)	(Date)		
/ARUN S PHASGE/ Primary Examiner.Art Unit 1756	4/6/15	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification 	Application/Control No. 13874004	Applicant(s)/Patent Under Reexamination HARRISON ET AL.
	Examiner ARUN S PHASGE	Art Unit 1756

<input checked="" type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input checked="" type="checkbox"/> T.D. <input type="checkbox"/> R.1.47															
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	16		32												

NONE	Total Claims Allowed: 21	
(Assistant Examiner)	(Date)	
/ARUN S PHASGE/ Primary Examiner.Art Unit 1756	4/6/15	O.G. Print Claim(s) 1
(Primary Examiner)	(Date)	O.G. Print Figure 1



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/874,004	04/30/2013	Stephen Harrison	10001108.0097

CONFIRMATION NO. 8025

POA ACCEPTANCE LETTER



OC000000074375437

24392
FISH & TSANG LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

Date Mailed: 04/03/2015

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/27/2015.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/nhassani/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/874,004	04/30/2013	Stephen Harrison	10001108.0097

126930
DENTONS US LLP
P.O. Box 061080
Chicago, IL 60606-7020

CONFIRMATION NO. 8025
POWER OF ATTORNEY NOTICE



Date Mailed: 04/03/2015


NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/27/2015.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/nhassani/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Application Number 	Application/Control No. 13/874,004	Applicant(s)/Patent under Reexamination HARRISON ET AL.	
Document Code - DISQ		Internal Document – DO NOT MAIL	

TERMINAL DISCLAIMER	<input checked="" type="checkbox"/> APPROVED	<input type="checkbox"/> DISAPPROVED
Date Filed : 27 MAR 2015	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:	
JAB	

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450**

Appl No.:	13/874,004	Confirmation No. 8025
Applicant:	Stephen Harrison	
Filed:	04/30/2013	
TC/A.U.:	1756	
Examiner:	PHASGE, ARUN S.	
Docket No.:	102663.0002US4	
Customer No.:	24392	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT

Sir:

In response to the Office action of December 29, 2014, please amend the above-identified application as follows:

Amendments to the Specification - None -

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Amendments to the Drawings - None -

Remarks/Arguments begin on page 6 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-20. (Canceled)

21. (previously presented) A method for recovering zinc and manganese from a brine, the method comprising the steps of:

- providing a brine, said brine comprising manganese and zinc;
- selectively removing silica and iron from the brine to produce a substantially silica free brine;
- adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed;
- separating the zinc and manganese precipitates from the brine.

22. (previously presented) The method of claim 21 wherein the precipitates of zinc and manganese are dissolved in an acid.

23. (previously presented) The method of claim 21 wherein the precipitates of zinc and manganese are dissolved in ammonium sulfate.

24. (previously presented) The method of claim 21 wherein the step of selectively removing silica and iron from the brine comprises providing iron (III) at a pH of between about 4.5 and 6 and precipitating the silica and iron from the brine.

25. (previously presented) The method of claim 21 wherein the step of precipitating the zinc and manganese comprises adding sufficient base to adjust the pH to between 6 and 8 and providing an air oxidant to the substantially silica free brine.

26. (previously presented) The method of claim 21 further comprising contacting the zinc with hydrochloric acid to produce zinc chloride.

27. (previously presented) A method for recovering zinc and manganese from a brine, the method comprising the steps of:
- providing a brine, said brine comprising manganese and zinc;
 - selectively removing silica and iron from the brine to produce a substantially silica free brine;
 - adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed;
 - separating the zinc and manganese precipitates from the brine;
 - dissolving the precipitates of zinc and manganese to produce a zinc manganese solution;
 - oxidizing the manganese to form a manganese precipitate and a zinc solution;
 - separating the manganese precipitate from the zinc solution;
 - recovering the zinc by electrochemical means.
28. (previously presented) The method of claim 27 wherein the step of selectively removing silica and iron from the brine comprises providing iron (III) at a pH of between about 4.5 and 6 and precipitating the silica and iron from the brine.
29. (previously presented) The method of claim 27 wherein the step of precipitating the zinc and manganese comprises adding sufficient base to adjust the pH to between 6 and 8 and providing an air oxidant to the substantially silica free brine.
30. (previously presented) The method of claim 27 wherein the step of dissolving the zinc and manganese comprises providing a mineral acid sufficient to dissolve the zinc and manganese precipitate.
31. (previously presented) The method of claim 27 wherein the step of recovering the zinc by electrochemical means comprises plating an electrode with zinc metal from the zinc solution.
32. (previously presented) A method for recovering zinc and manganese from a brine, the method comprising the steps of:
- providing a brine, said brine comprising manganese and zinc;

selectively removing silica and iron from the brine to produce a substantially silica free brine that includes manganese and zinc;
removing the zinc from the substantially silica free brine;
extracting manganese from the substantially silica free brine;
oxidizing the manganese to produce a manganese dioxide precipitate; and
recovering the magnesium dioxide precipitate.

33. (previously presented) The method of claim 32 wherein the step of selectively removing silica and iron from the brine comprises providing iron (III) at a pH of between about 4.5 and 6 and precipitating the silica.
34. (previously presented) The method of claim 32 wherein the zinc is removed from the substantially silica free brine by ion exchange.
35. (previously presented) The method of claim 32 wherein the step of oxidizing the manganese to produce manganese dioxide comprises electrolytic deposition.
36. (previously presented) A method for recovering zinc and manganese from a brine, the method comprising the steps of:
providing a brine, said brine comprising manganese and zinc;
selectively removing silica and iron from the brine to produce a substantially silica free brine that comprises manganese and zinc;
extracting manganese and zinc from the substantially silica free brine to produce a manganese zinc solution;
electrochemically removing manganese from the manganese zinc solution to produce a residual solution that includes zinc; and
electrochemically removing zinc from the residual solution.
37. (previously presented) The method of claim 36 wherein the step of selectively removing silica and iron from the brine comprises providing iron (III) at a pH of between about 4.5 and 6 and precipitating the silica.

38. (previously presented) The method of claim 36 wherein the step extracting manganese and zinc from the substantially silica free brine comprises extracting the manganese and zinc with a solvent selected from the group consisting of phosphines, phosphoric acids, and phosphinic acids.
39. (previously presented) The method of claim 36 wherein the step of recovering the manganese by electrochemical means comprises plating an electrode with manganese metal from the manganese zinc solution.
40. (previously presented) The method of claim 36 wherein the step of electrochemically removing the zinc means comprises plating an electrode with zinc metal from the zinc solution.
41. (previously presented) A method for recovering zinc and manganese from a brine, the method comprising the steps of:
- providing a brine, said geothermal brine comprising manganese and zinc;
 - selectively removing silica and iron from the brine to produce a substantially silica free brine that includes manganese and zinc;
 - removing the zinc from the substantially silica free brine;
 - extracting manganese from the substantially silica free brine.

REMARKS/ARGUMENTS

Double Patenting

Claims 21-41 were rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-20 of U.S. Patent No. 8,518,232. Applicant submits a terminal disclaimer over the '232 patent herewith. The rejection should therefore be overcome.

Claims 21-41 were rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-20 of U.S. Patent No. 8,454,816. Applicant submits a terminal disclaimer over the '816 patent herewith. The rejection should therefore be overcome.

Claims 21-41 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting over claims 32-47 of U.S. Patent Application 13/ 943,395. Applicant will submit a terminal disclaimer in the '395 matter as appropriate when the issue of double patenting is the last remaining rejection in that case. The rejection should therefore be overcome.

Request For Allowance

Claims 21-41 are pending in this application. The applicant requests allowance of all pending claims.

Respectfully submitted,
Fish & Tsang, LLP

Date: March 27, 2015

By /Martin Fessenmaier/
Martin Fessenmaier, Ph.D.
Reg. No. 46697

Fish & Tsang, LLP
2603 Main Street, Suite 1000
Irvine, CA 92614-4271
Telephone (949) 943-8300
Fax (949) 943-8358

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**TERMINAL DISCLAIMER TO OBIATE A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**Docket Number (Optional)
102663.0002US4

In re Application of: Stephen Harrison, et al.,

Application No.: 13/874004

Filed: April 30, 2013

For: Selective Recovery Of Manganese And Zinc From Geothermal Brines

The owner*, Simbol, Inc., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 8518232 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

2. ☒ The undersigned is an attorney or agent of record. Reg. No. 46697

/Martin Fessenmaier/
Signature

2015-03-27
Date

Martin Fessenmaier
Typed or printed name

949-943-8300
Telephone Number

- ☒ Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Privacy Act Statement

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
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8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
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STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Stephen Harrison / Simbol, Inc.

Application No./Patent No.: 13/874004 Filed/Issue Date: April 30, 2013

Titled: Selective Recovery Of Manganese and Zinc From Geothermal Brines

Simbol, Inc., a corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;
2. ☐ an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or
3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 031426, Frame 0133, or for which a copy therefore is attached.

OR

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Martin Fessenmaier/

Signature

2015-03-27

Date

Martin Fessenmaier

Printed or Typed Name

Agent for Applicant Simbol In

Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Privacy Act Statement

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Electronic Patent Application Fee Transmittal

Application Number:	13874004			
Filing Date:	30-Apr-2013			
Title of Invention:	Selective Recovery of Manganese and Zinc From Geothermal Brines			
First Named Inventor/Applicant Name:	Stephen Harrison			
Filer:	Martin Fessenmaier/Marutzzella Castro			
Attorney Docket Number:	10001108.0097			
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Statutory or Terminal Disclaimer	1814	2	160	320
Total in USD (\$)				320

Electronic Acknowledgement Receipt

EFS ID:	21905931
Application Number:	13874004
International Application Number:	
Confirmation Number:	8025
Title of Invention:	Selective Recovery of Manganese and Zinc From Geothermal Brines
First Named Inventor/Applicant Name:	Stephen Harrison
Customer Number:	126930
Filer:	Martin Fessenmaier/Marutzzella Castro
Filer Authorized By:	Martin Fessenmaier
Attorney Docket Number:	10001108.0097
Receipt Date:	27-MAR-2015
Filing Date:	30-APR-2013
Time Stamp:	18:28:19
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 320
RAM confirmation Number	4952
Deposit Account	500341
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and examination processing fees)

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Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		2015-03-25_Response-01_non-final_.pdf	33138	yes	6
			d5c5368a7b418fd6c6428b133223d625fd8ddea5		
	Multipart Description/PDF files in .zip description				
	Document Description	Start	End		
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1		
	Claims	2	5		
	Applicant Arguments/Remarks Made in an Amendment	6	6		
Warnings:					
Information:					
2	Power of Attorney	POA_signed.pdf	1383149	no	3
			3173468dd4e29a21c92424e43807b1bfc569c547		
Warnings:					
Information:					
3	Terminal Disclaimer Filed	TD_2US1.pdf	373963	no	2
			66123f6ece995d02c646e92831b58b1569ce3d52		
Warnings:					
Information:					
4	Terminal Disclaimer Filed	TD_2US2.pdf	373973	no	2
			04a60595022daee163fa2f8ab1c36484ab8fffa3		
Warnings:					
Information:					
5	Assignee showing of ownership per 37 CFR 3.73.	StmntOwnership.pdf	422832	no	2
			1ff065929a2d9fdf02ff7629cccb42ebd59cf607		
Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	30340	no	2
			21318d87d96d0a7463631ef2bb7225461ba5b81b		

Warnings:	
Information:	
Total Files Size (in bytes):	2617395
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>	

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:



Practitioners associated with Customer Number:

24392

OR



Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number

Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:



The address associated with Customer Number:

24392

OR


<input type="checkbox"/>	Firm or Individual Name			
<input type="checkbox"/>	Address			
<input type="checkbox"/>	City	State	Zip	
<input type="checkbox"/>	Country			
<input type="checkbox"/>	Telephone	Email		

Assignee Name and Address: **Simbol, Inc.**
6920 Koll Center Parkway, Suite 123, Pleasanton, CA 94566

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	3-3-2015
Name	Stephen Harrison	Telephone	925-226-7418
Title	Chief Technology Officer and Vice President		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FREE OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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**TERMINAL DISCLAIMER TO OBIATE A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**

Docket Number (Optional)

102663.0002US4

In re Application of: Stephen Harrison, et al.,

Application No.: 13/874004

Filed: April 30, 2013

For: Selective Recovery Of Manganese And Zinc From Geothermal Brines

The owner*, Simbol, Inc., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 8545816 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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expires for failure to pay a maintenance fee;

is held unenforceable;

is found invalid by a court of competent jurisdiction;

is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;

has all claims canceled by a reexamination certificate;

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is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

2. ☒ The undersigned is an attorney or agent of record. Reg. No. 46697

/Martin Fessenmaier/

Signature

2015-03-27

Date

Martin Fessenmaier

Typed or printed name

949-943-8300

Telephone Number

- ☒ Terminal disclaimer fee under 37 CFR 1.20(d) included.

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*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

ESM / PETITIONER EX 1002_73

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/874,004	Filing Date 04/30/2013	<input type="checkbox"/> To be Mailed
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 ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	(Column 1)	(Column 2)	(Column 3)	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	03/27/2015	CLAIMS REMAINING AFTER AMENDMENT					
	Total (37 CFR 1.16(i))	* 21	Minus	** 21	= 0	X \$40 =	0
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 5	= 0	X \$210 =	0
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))						
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
TOTAL ADD'L FEE						0	
AMENDMENT	(Column 1)	(Column 2)	(Column 3)	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
		CLAIMS REMAINING AFTER AMENDMENT					
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))						
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
TOTAL ADD'L FEE							

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

 LIE
 /THUY TA/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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ESM / PETITIONER EX 1002_75



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/874,004	04/30/2013	Stephen Harrison	10001108.0097	8025

126930 7590 12/29/2014
DENTONS US LLP
P.O. Box 061080
Chicago, IL 60606-7020

EXAMINER

PHASGE, ARUN S

ART UNIT	PAPER NUMBER
----------	--------------

1756

NOTIFICATION DATE	DELIVERY MODE
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12/29/2014

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents.us@dentons.com

Office Action Summary	Application No. 13/874,004	Applicant(s) HARRISON ET AL.	
	Examiner ARUN S. PHASGE	Art Unit 1756	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 21-41 is/are pending in the application.
5a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) _____ is/are allowed.
- 7) ☒ Claim(s) 21-41 is/are rejected.
- 8) ☐ Claim(s) _____ is/are objected to.
- 9) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some** c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date 8/15/13.
- 3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 4) ☐ Other: _____.

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the claims at issue are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the reference application or patent either is shown to

be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit <http://www.uspto.gov/forms/>. The filing date of the application will determine what form should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to <http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp>.

Claims 21-41 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of U.S. Patent No. 8,518,232. Although the claims at issue are not identical, they are not patentably distinct from each other because the claims of the instant application when read in light of the specification is clearly encompassed and rendered obvious by the claims of the prior patent.

Claims 21-41 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of U.S. Patent No. 8,454,816. Although the claims at issue are not identical, they are not patentably distinct from each other because the

claims of the instant application when read in light of the specification is clearly encompassed and rendered obvious by the claims of the prior patent.

Claims 21-41 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 32-47 of copending Application No. 13/943,395. Although the claims at issue are not identical, they are not patentably distinct from each other because the claims of the instant application when read in light of the specification is clearly encompassed and rendered obvious by the claims of the copending application.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 21-41 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 32-47 of copending Application No. 13/943,395. Although the claims at issue are not identical, they are not patentably distinct from each other because the claims of the instant application when read in light of the specification is clearly encompassed and rendered obvious by the claims of the copending application.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ARUN S. PHASGE whose telephone number is (571)272-1345. The examiner can normally be reached on MONDAY-THURSDAY, 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith D. Hendricks can be reached on (571) 272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ARUN S PHASGE/
Primary Examiner, Art Unit 1756

asp

Application/Control Number: 13/874,004
Art Unit: 1756

Page 6

Notice of References Cited	Application/Control No. 13/874,004	Applicant(s)/Patent Under Reexamination HARRISON ET AL.	
	Examiner ARUN S. PHASGE	Art Unit 1756	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-8,454,816	06-2013	Harrison et al.	205/540
*	B	US-8,518,232	08-2013	Harrison et al.	205/539
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

WEST Search History for Application 13874004

Delete Selected

Add More Searches

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Select	Query	Database	Operator	Plurals	Thesaurus	Date
<input type="button" value="All"/> <input type="button" value="All Int."/> <input type="button" value="All P/A"/>						
Prior Art						
<input type="checkbox"/>	c22b47/00.cpc. or c22b19/00.cpc. or c25c1/10.cpc. or c25c1/16.cpc.	PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS	OR	YES		12-23-2014
<input type="checkbox"/>	(c22b47/00.cpc. or c22b19/00.cpc. or c25c1/10.cpc. or c25c1/16.cpc.) and (manganese and zinc)	PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS	OR	YES		12-23-2014
<input type="checkbox"/>	(c22b47/00.cpc. or c22b19/00.cpc. or c25c1/10.cpc. or c25c1/16.cpc.) and (manganese)	PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS	OR	YES		12-23-2014
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<input type="checkbox"/>	manganese or	PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS	OR	YES		12-23-2014
<input type="checkbox"/>	manganese or mn	PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS	OR	YES		12-23-2014
<input type="checkbox"/>	(manganese or mn) and (zinc or zn)	PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS	OR	YES		12-23-2014
<input type="checkbox"/>	(manganese or mn and (zinc or zn)) and silica	PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS	OR	YES		12-23-2014
<input type="checkbox"/>	(manganese or mn and (zinc or zn) and silica) and brine	PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS	OR	YES		12-23-2014
<input type="checkbox"/>	(manganese or mn and (zinc or zn) and silica and brine) and (manganese same zinc)	PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS	OR	YES		12-23-2014
<input type="checkbox"/>	(manganese or mn and (zinc or zn) and silica and brine and (manganese same zinc)) and iron	PGPB, USPT, USOC, EPAB, JPAB, DWPI, TDBD, FPRS	OR	YES		12-23-2014

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Help

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Search Notes 	Application/Control No. 13874004	Applicant(s)/Patent Under Reexamination HARRISON ET AL.
	Examiner ARUN S PHASGE	Art Unit 1756

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
205	539, 540, 573, 602-608	12/21/14	asp

SEARCH NOTES		
Search Notes	Date	Examiner
WEST his attached	12/22/14	asp
inventor name searched in eDAN	12/22/14	asp

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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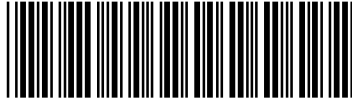
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BIB DATA SHEET


CONFIRMATION NO. 8025

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.	
13/874,004	04/30/2013	205	1756	10001108.0097	
RULE					
APPLICANTS SIMBOL INC., Pleasanton, CA INVENTORS Stephen Harrison, Benicia, CA; Samaresh Mohanta, San Diego, CA; ** CONTINUING DATA ***** This application is a CON of 12/880,924 09/13/2010 PAT 8454816 which claims benefit of 61/241,479 09/11/2009 * (*)Data provided by applicant is not consistent with PTO records. ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** ** SMALL ENTITY ** 05/29/2013					
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Verified and Acknowledged <u>/ARUN S PHASGE/</u> Examiner's Signature	<input type="checkbox"/> Met after Allowance Initials	STATE OR COUNTRY CA	SHEETS DRAWINGS 11	TOTAL CLAIMS 21	INDEPENDENT CLAIMS 5
ADDRESS DENTONS US LLP P.O. Box 061080 Chicago, IL 60606-7020 UNITED STATES					
TITLE Selective Recovery of Manganese and Zinc From Geothermal Brines					
FILING FEE RECEIVED 1260	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

<i>Index of Claims</i> 	Application/Control No. 13874004	Applicant(s)/Patent Under Reexamination HARRISON ET AL.
	Examiner ARUN S PHASGE	Art Unit 1756

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47			
CLAIM		DATE							
Final	Original	12/22/2014							
	1	-							
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	3	-							
	4	-							
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	6	-							
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	31	✓							
	32	✓							
	33	✓							
	34	✓							
	35	✓							
	36	✓							

<i>Index of Claims</i> 	Application/Control No. 13874004	Applicant(s)/Patent Under Reexamination HARRISON ET AL.
	Examiner ARUN S PHASGE	Art Unit 1756

✓	Rejected
=	Allowed

-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input type="checkbox"/> T.D. <input type="checkbox"/> R.1.47										
CLAIM		DATE								
Final	Original	12/22/2014								
	37	✓								
	38	✓								
	39	✓								
	40	✓								
	41	✓								

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13874004
	Filing Date		2013-04-30
	First Named Inventor	HARRISON, S.	
	Art Unit	1736	
	Examiner Name	N/A	
	Attorney Docket Number	076165.000097	

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
/A.P./	1	4016075		1977-04-05	Wilkins	
↑	2	4116856		1978-09-26	Lee et al.	
	3	4159311		1979-06-26	Lee et al.	
	4	4221767		1980-09-09	Lee et al.	
	5	4291001		1981-09-22	Repsher et al.	
	6	4347327		1982-08-31	Lee et al.	
	7	4348295		1982-09-07	Burba, III	
/A.P./	8	4348296		1982-09-07	Bauman, et al.	

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	13874004
Filing Date	2013-04-30
First Named Inventor	HARRISON, S.
Art Unit	1736
Examiner Name	N/A
Attorney Docket Number	076165.000097

/A.P./	9	4348297		1982-09-07	Bauman, et al.	
	10	4376100		1983-03-08	Lee et al.	
	11	4430311		1984-02-07	Lee et al.	
	12	4461714		1984-07-24	Burba, III	
	13	4472362		1984-09-18	Burba, III	
	14	4540509		1985-09-10	Burba, III	
	15	4727167		1988-02-23	Burba, III, et al.	
	16	5135652		1992-08-04	Boateng	
	17	5254225		1993-10-19	Gallup	
	18	5389349		1995-02-14	Bauman et al.	
↓ /A.P./	19	5599516		1997-02-04	Bauman et al.	

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		13874004
Filing Date		2013-04-30
First Named Inventor	HARRISON, S.	
Art Unit	1736	
Examiner Name	N/A	
Attorney Docket Number	076165.000097	

/A.P./	20	6017500		2000-01-25	Mehta	
/A.P./	21	6280693		2001-08-28	Bauman et al.	
/A.P./	22	6458184		2002-10-01	Featherstone	
/A.P./	23	6555078		2003-04-29	Mehta	
/A.P./	24	6682644		2004-01-27	Feathersone et al.	
/A.P./	25	8454816		2013-06-04	Harrison et al.	

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
/A.P./	1	20010000597	A1	2001-05-03	Featherstone	
/A.P./	2	20030226761	A1	2003-12-11	Featherstone et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		13874004
Filing Date		2013-04-30
First Named Inventor	HARRISON, S.	
Art Unit	1736	
Examiner Name	N/A	
Attorney Docket Number	076165.000097	

Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²ⁱ	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1							<input type="checkbox"/>

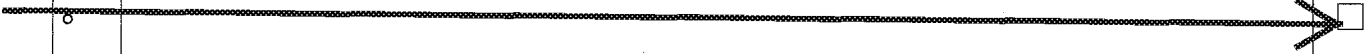
If you wish to add additional Foreign Patent Document citation information please click the Add button

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
/A.P./	1	COLE, et al., "Zinc Solvent Extraction in the Process Industries," 24(2) Mineral Proc. & Extractive Metallurgy Rev, 2003, pp. 91-137	<input type="checkbox"/>
/A.P./	2	DREISINGER et al., "New Developments in the Boleo Copper-Cobalt-Zinc-Manganese Project," available at http://bajamining.com/_resources/Reports/alta_paper_2006_boleo_final.pdf	<input type="checkbox"/>
/A.P./	3	GOTFRYD, et al., "Recovery of Zinc(II) from Acidic Sulfate Solutions, Simulation of Counter-Current Extraction Stripping Process," 38 Physiochemical Problems of Mineral Processing, 2004, pp. 113-120	<input type="checkbox"/>
/A.P./	4	KAWAI, et al., "Solvent extraction of zinc(II) and manganese(II) with 5,10,15,20-tetraphenyl-21H, 23H-porphine(TPP) through the metal exchange reaction of lead(II)-TPP," 7 Solvent Extr. Res. Dev. Japan 2000, pp. 36-43	<input type="checkbox"/>
/A.P./	5	LEE, et al., "Solvent Extraction of Zinc from Strong Hydrochloric Acid Solution with Alamine 336," 30(7) Bull, Korean chem. Soc. 2009, pp. 1526-1530	<input type="checkbox"/>
/A.P./	6	Co-pending application USSN 13/539,106, filed June 29, 2012	<input type="checkbox"/>
	7		<input type="checkbox"/>

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	13874004
Filing Date	2013-04-30
First Named Inventor	HARRISON, S.
Art Unit	1736
Examiner Name	N/A
Attorney Docket Number	076165.000097


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If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature	/Arun Phasge/	Date Considered	12/22/2014
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	13874004
Filing Date	2013-04-30
First Named Inventor	HARRISON, S.
Art Unit	1736
Examiner Name	N/A
Attorney Docket Number	076165.000097

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

- ☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

- ☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- ☐ See attached certification statement.
- ☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- ☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	<i>Karthika</i>	Date (YYYY-MM-DD)	2013-08-15
Name/Print	Karthika Perumal	Registration Number	69,296

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**



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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	FILE WRAPPER LOCATION
13/874,004		1756	



Correspondence Address/Fee Address Change

The following fields have been set to Customer Number 126930 on 11/18/2014

- Correspondence Address

The address of record for Customer Number 126930 is:

126930
DENTONS US LLP
P.O. Box 061080
Chicago, IL 60606-7020



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/874,004	04/30/2013	Stephen Harrison	076165.000097

26263
DENTONS US LLP
P.O. BOX 061080
CHICAGO, IL 60606-1080

CONFIRMATION NO. 8025
POA ACCEPTANCE LETTER



Date Mailed: 07/03/2014

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/01/2014.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/snguyen/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/874,004	04/30/2013	Stephen Harrison	076165.000097

35979
Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

CONFIRMATION NO. 8025
POWER OF ATTORNEY NOTICE



OC000000069410010

Date Mailed: 07/03/2014

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/01/2014.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/snguyen/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:



Practitioners associated with Customer Number:

26263

OR



Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number

Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:



The address associated with Customer Number:

26263

OR

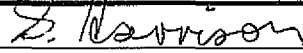
<input type="checkbox"/>	Firm or Individual Name			
	Address			
	City	State	Zip	
	Country			
	Telephone	Email		

Assignee Name and Address: Simbol Inc.
6920 Koll Center Parkway, Suite 216
Pleasanton, CA 94566

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	May 30 th 2014
Name	Stephen Harrison	Telephone	925.226.7418
Title	Chief Technology Officer & Vice President		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: Simbol Inc.Application No./Patent No.: 13/874,004 Filed/Issue Date: April 30, 2013Titled: Selective Recovery of Manganese and Zinc From Geothermal BrinesSimbol Inc., a corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 031426, Frame 0133, or for which a copy thereof is attached.
- B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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STATEMENT UNDER 37 CFR 3.73(c)

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5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
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6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
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☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Heather Khassian/

July 1, 2014

Signature

Date

Heather Khassian

55194

Printed or Typed Name

Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of **Congress** submitting a request involving an individual, to whom the record pertains, when the individual **has** requested assistance from the Member with respect to the subject matter of the **record**.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	19462125
Application Number:	13874004
International Application Number:	
Confirmation Number:	8025
Title of Invention:	Selective Recovery of Manganese and Zinc From Geothermal Brines
First Named Inventor/Applicant Name:	Stephen Harrison
Customer Number:	35979
Filer:	Heather Megan Khassian/Debra Odum
Filer Authorized By:	Heather Megan Khassian
Attorney Docket Number:	076165.000097
Receipt Date:	01-JUL-2014
Filing Date:	30-APR-2013
Time Stamp:	08:26:39
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	20140701PowerofAttorney.pdf	31601 7b547bd5ba65234f50c03113a6d52444f1865ac1	no	1

Warnings:

Information:

ESM / PETITIONER EX 1002_102

2	Assignee showing of ownership per 37 CFR 3.73.	20140701AssigneeStatementU nder37DFR373.pdf	84368 df72c5ea9633778a0c5615177c6709d082f5 2962	no	3
Warnings:					
Information:					
Total Files Size (in bytes):			115969		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/874,004	04/30/2013	Stephen Harrison	076165.000097

35979
Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

CONFIRMATION NO. 8025
POA ACCEPTANCE LETTER



Date Mailed: 10/24/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 10/17/2013.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/hsarwari/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

POWER OF ATTORNEY BY APPLICANT

This Power of Attorney by Applicant is directed to the application titled **SELECTIVE RECOVERY OF MANGANESE AND ZINC FROM GEOTHERMAL BRINES**,

___ the application of which is attached hereto;

X the US Application No. 13/874,004 filed on April 30, 2013; or

___ the PCT international application number _____ filed on _____.

I hereby revoke all previous powers of attorney given in the above-identified application.

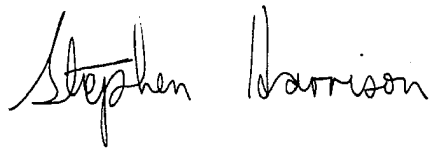
I hereby appoint the practitioners associated with Bracewell & Giuliani LLP's U.S. Patent and Trademark Office **Customer No. 35979** as my/our attorney(s) or agent(s), and to transact all business in the U.S. Patent and Trademark Office connected therewith for the application referenced above.

Please **direct all correspondence** to the address associated with:

U.S. Patent and Trademark Office **Customer No. 35979**

In the event of questions, the attorney in charge can be reached at michaels@bgllp.com or (713) 221.1112.

I am the Applicant's Assignee or Person to Whom the Inventor is Under an Obligation to Assign.



SIGNATUR _____ DATE: September 25th 2013 _____

NAME: **Stephen Harrison**

TITLE: **Chief Technology Officer & Vice-President**

COMPANY: **Simbol Inc.**

DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

This declaration is directed to the application titled **SELECTIVE RECOVERY OF MANGANESE AND ZINC FROM GEOTHERMAL BRINES**,

___ the application of which is attached hereto;

 x the US Application No. 13/874,004 filed on April 30, 2013; or

___ the PCT international application number _____ filed on _____.

My residence and post office address are as stated below my name.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I acknowledge the duty to review and understand the contents of the above-identified application, including the claims.

I acknowledge the duty to disclose information that is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a),

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States application(s) listed below:

<u>NUMBER</u>	<u>DATE FILED</u>
12/880,924	September 13, 2010
61/241,479	September 11, 2009

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATION(S)

NUMBER	COUNTRY	DATE FILED	PRIORITY CLAIMED
_____	_____	_____	___ YES ___ NO

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application

is not disclosed in any prior United States application in the manner provided by the first paragraph of Title 37, Code of Federal Regulations, § 1.56(a), that occurred between the filing date of the prior application and the national or PCT international filing date of this application:

U.S. Parent Application No: 61/241,479

Filing Date: September 11, 2009

PCT Parent Application No: _____

Filing Date: _____

I hereby acknowledge that any willful false statement made in this Declaration is punishable under Title 18 of United States Code § 1001 by fine or imprisonment of not more than five (5) years, or both.

Please direct all correspondence to the address associated with:

U.S. Patent and Trademark Office **Customer Number 35979**

In the event of questions, the attorney in charge can be reached at MichaelS@bgllp.com or (713) 221.1112.

INVENTOR'S NAME: **Stephen Harrison**

SIGNATURE: _____

DATE: _____

25 / 9 / 2013

RESIDENCE: 134 Panorama Drive, Benicia, CA 94510

POST OFFICE ADDRESS: SAME

INVENTOR'S NAME: **Samaresh Mohanta**

SIGNATURE: 

DATE: 9/25/2013

RESIDENCE: 2410 Brandini Dr., Dublin, CA 94568

POST OFFICE ADDRESS: SAME

Electronic Acknowledgement Receipt

EFS ID:	17154969
Application Number:	13874004
International Application Number:	
Confirmation Number:	8025
Title of Invention:	Selective Recovery of Manganese and Zinc From Geothermal Brines
First Named Inventor/Applicant Name:	Stephen Harrison
Customer Number:	35979
Filer:	Karthika Perumal/Debra Odum
Filer Authorized By:	Karthika Perumal
Attorney Docket Number:	076165.000097
Receipt Date:	17-OCT-2013
Filing Date:	30-APR-2013
Time Stamp:	14:56:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	20131017PowerofAttorney.pdf	13416 dd447876d9eb4c74e3d5fc9e218d3351ac26f3c2	no	1

Warnings:

Information:

ESM / PETITIONER EX 1002_109

2	Oath or Declaration filed	20131017Declaration.pdf	44453	no	3
			57a3a35fc6da4c44ab7151ff6021141259877a79		
Warnings:					
Information:					
Total Files Size (in bytes):				57869	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/874,004	04/30/2013	Stephen Harrison	076165.000097

CONFIRMATION NO. 8025

PUBLICATION NOTICE



OC00000063786771

35979
Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

Title: Selective Recovery of Manganese and Zinc From Geothermal Brines

Publication No. US-2013-0236378-A1

Publication Date: 09/12/2013

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		13874004
	Filing Date		2013-04-30
	First Named Inventor	HARRISON, S.	
	Art Unit	1736	
	Examiner Name	N/A	
	Attorney Docket Number	076165.000097	

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	4016075		1977-04-05	Wilkins	
	2	4116856		1978-09-26	Lee et al.	
	3	4159311		1979-06-26	Lee et al.	
	4	4221767		1980-09-09	Lee et al.	
	5	4291001		1981-09-22	Repsher et al.	
	6	4347327		1982-08-31	Lee et al.	
	7	4348295		1982-09-07	Burba, III	
	8	4348296		1982-09-07	Bauman, et al.	

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	13874004
Filing Date	2013-04-30
First Named Inventor	HARRISON, S.
Art Unit	1736
Examiner Name	N/A
Attorney Docket Number	076165.000097

9	4348297		1982-09-07	Bauman, et al.	
10	4376100		1983-03-08	Lee et al.	
11	4430311		1984-02-07	Lee et al.	
12	4461714		1984-07-24	Burba, III	
13	4472362		1984-09-18	Burba, III	
14	4540509		1985-09-10	Burba, III	
15	4727167		1988-02-23	Burba, III, et al.	
16	5135652		1992-08-04	Boateng	
17	5254225		1993-10-19	Gallup	
18	5389349		1995-02-14	Bauman et al.	
19	5599516		1997-02-04	Bauman et al.	

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		13874004
Filing Date		2013-04-30
First Named Inventor	HARRISON, S.	
Art Unit	1736	
Examiner Name	N/A	
Attorney Docket Number	076165.000097	

	20	6017500		2000-01-25	Mehta	
	21	6280693		2001-08-28	Bauman et al.	
	22	6458184		2002-10-01	Featherstone	
	23	6555078		2003-04-29	Mehta	
	24	6682644		2004-01-27	Feathersone et al.	
	25	8454816		2013-06-04	Harrison et al.	

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	20010000597	A1	2001-05-03	Featherstone	
	2	20030226761	A1	2003-12-11	Featherstone et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		13874004
Filing Date		2013-04-30
First Named Inventor	HARRISON, S.	
Art Unit	1736	
Examiner Name	N/A	
Attorney Docket Number	076165.000097	

Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²ⁱ	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1							<input type="checkbox"/>

If you wish to add additional Foreign Patent Document citation information please click the Add button

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	COLE, et al., "Zinc Solvent Extraction in the Process Industries," 24(2) Mineral Proc. & Extractive Metallurgy Rev, 2003, pp. 91-137	<input type="checkbox"/>
	2	DREISINGER et al., "New Developments in the Boleo Copper-Cobalt-Zinc-Manganese Project," available at http://bajamining.com/_resources/Reports/alta_paper_2006_boleo_final.pdf	<input type="checkbox"/>
	3	GOTFRYD, et al., "Recovery of Zinc(II) from Acidic Sulfate Solutions, Simulation of Counter-Current Extraction Stripping Process," 38 Physiochemical Problems of Mineral Processing, 2004, pp. 113-120	<input type="checkbox"/>
	4	KAWAI, et al., "Solvent extraction of zinc(II) and manganese(II) with 5,10,15,20-tetraphenyl-21H, 23H-porphine(TPP) through the metal exchange reaction of lead(II)-TPP," 7 Solvent Extr. Res. Dev. Japan 2000, pp. 36-43	<input type="checkbox"/>
	5	LEE, et al., "Solvent Extraction of Zinc from Strong Hydrochloric Acid Solution with Alamine 336," 30(7) Bull, Korean chem. Soc. 2009, pp. 1526-1530	<input type="checkbox"/>
	6	Co-pending application USSN 13/539,106, filed June 29, 2012	<input type="checkbox"/>
	7		<input type="checkbox"/>

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	13874004
Filing Date	2013-04-30
First Named Inventor	HARRISON, S.
Art Unit	1736
Examiner Name	N/A
Attorney Docket Number	076165.000097

8		<input type="checkbox"/>
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If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	13874004
Filing Date	2013-04-30
First Named Inventor	HARRISON, S.
Art Unit	1736
Examiner Name	N/A
Attorney Docket Number	076165.000097

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

- ☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

- ☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- ☐ See attached certification statement.
- ☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- ☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	<i>Karthika</i>	Date (YYYY-MM-DD)	2013-08-15
Name/Print	Karthika Perumal	Registration Number	69,296

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Electronic Acknowledgement Receipt

EFS ID:	16603089
Application Number:	13874004
International Application Number:	
Confirmation Number:	8025
Title of Invention:	Selective Recovery of Manganese and Zinc From Geothermal Brines
First Named Inventor/Applicant Name:	Stephen Harrison
Customer Number:	35979
Filer:	Karthika Perumal/Debra Odum
Filer Authorized By:	Karthika Perumal
Attorney Docket Number:	076165.000097
Receipt Date:	15-AUG-2013
Filing Date:	30-APR-2013
Time Stamp:	16:28:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	20130815InformationDiscosur eStatement.pdf	95033 9cadca293fc99f1533b1a32d6162c7a14fe764d0	no	6

Warnings:

Information:

ESM / PETITIONER EX 1002_118

This is not an USPTO supplied IDS fillable form					
2	Non Patent Literature	Cole.PDF	95639 90d04a8ff75ca8e6f5a7b0a8ff4fa0f4d25fc070	no	2
Warnings:					
Information:					
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Information:					
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Warnings:					
Information:					
5	Non Patent Literature	Kawai.PDF	347015 20861b24f1c61bf35e69302ccfb9fa7ae2565 a72	no	8
Warnings:					
Information:					
6	Non Patent Literature	Lee.PDF	350404 2720c89edd9cafb37e600638b5be9ee5e28 2afa5	no	5
Warnings:					
Information:					
Total Files Size (in bytes):			2032577		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	076165.000097
		Application Number	13 / 874 , 004
Title of Invention			
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

Secrecy Order 37 CFR 5.2

<input type="checkbox"/> Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)	
--	--

Inventor Information:

Inventor 1 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City		State/Province	Country of Residence	
Mailing Address of Inventor:				
Address 1				
Address 2				
City		State/Province		
Postal Code		Country		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add				

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.			
Customer Number	35979		
Email Address	docketing@bglp.com	Add Email	Remove Email

Application Information:

Title of the Invention			
Attorney Docket Number	076165.000097	Small Entity Status Claimed	<input checked="" type="checkbox"/>
Application Type			
Subject Matter			
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	076165.000097
	Application Number	13 / 874 , 004
Title of Invention		

Publication Information:
☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	35979		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12880924	non provisional of	61241479	2009-09-11

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)¹ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	076165.000097
		Application Number	13/874,004
Title of Invention			
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	<div>Remove</div> Access Code ⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	076165.000097
	Application Number	13 / 874 , 004
Title of Invention		

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

- ☐ Assignee
 ☐ Legal Representative under 35 U.S.C. 117
 ☐ Joint Inventor
- ☐ Person to whom the inventor is obligated to assign.
 ☐ Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Applicant:

Address 1			
Address 2			
City		State/Province	
Country		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

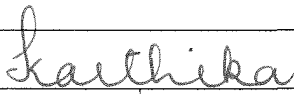
Complete this section only if non-applicant assignee information is desired to be included on the patent application publication in accordance with 37 CFR 1.215(b). Do not include in this section an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest), as the patent application publication will include the name of the applicant(s).

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	076165.000097
		Application Number	13/874,004
Title of Invention			

If the Assignee is an Organization check here. <input type="checkbox"/>				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee Data may be generated within this form by selecting the Add button.				

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.					
Signature				Date (YYYY-MM-DD)	2013-06-11
First Name	Karthika	Last Name	Perumal	Registration Number	69296
Additional Signature may be generated within this form by selecting the Add button.					

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Electronic Acknowledgement Receipt

EFS ID:	16005704
Application Number:	13874004
International Application Number:	
Confirmation Number:	8025
Title of Invention:	Selective Recovery of Manganese and Zinc From Geothermal Brines
First Named Inventor/Applicant Name:	Stephen Harrison
Customer Number:	35979
Filer:	Karthika Perumal/Debra Odum
Filer Authorized By:	Karthika Perumal
Attorney Docket Number:	076165.000097
Receipt Date:	11-JUN-2013
Filing Date:	30-APR-2013
Time Stamp:	14:30:22
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	20130611SupplementalApplica tionDataSheet.pdf	123988 <small>721a25aa2f89357808ccc61925b0ebb51fa31 6a19</small>	no	5

Warnings:

Information:

ESM / PETITIONER EX 1002_125

Total Files Size (in bytes):

123988

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 13/874,004				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A				
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	300		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	21 minus 20 =	*	x 40 =	40	OR					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	5 minus 3 =	*	x 210 =	420						
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00						
			TOTAL	1190		TOTAL				
* If the difference in column 1 is less than zero, enter "0" in column 2.										
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
13/874,004	04/30/2013	1736	1260	076165.000097	21	5

CONFIRMATION NO. 8025

35979

Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

FILING RECEIPT



Date Mailed: 06/07/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Stephen Harrison, Benicia, CA;
Samaresh Mohanta, San Diego, CA;

Applicant(s)

Simbol Inc., Pleasanton, CA

Assignment For Published Patent Application

Simbol Inc., Pleasanton, CA

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 12/880,924 09/13/2010 PAT 8454816
which claims benefit of 61/241,479 09/11/2009 *

(*)Data provided by applicant is not consistent with PTO records.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 05/29/2013

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/874,004**

Projected Publication Date: 09/12/2013

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

Selective Recovery of Manganese and Zinc From Geothermal Brines

Preliminary Class

423

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/874,004	04/30/2013	Stephen Harrison	076165.000097

CONFIRMATION NO. 8025

35979
Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

NOTICE



Date Mailed: 06/07/2013

INFORMATIONAL NOTICE TO APPLICANT

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
All

Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:)	
Stephen Harrison)	Examiner: Not Assigned
)	
Serial No.: Not Assigned)	Art Unit: Not Assigned
)	
Filed: April 30, 2013)	Confirmation No.: Not Assigned
)	
For: SELECTIVE RECOVERY OF)	Attorney Docket No. 076165.000097
MANGANESE AND ZINC FROM)	
GEOTHERMAL BRINES)	
)	

PRELIMINARY AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir,

By this Preliminary Amendment, please amend the above-identified application as set forth below.

Amendments to the specification begin on page 2 of this Preliminary Amendment.

Amendments to the claims begin on page 3 of this Preliminary Amendment.

Please replace paragraph 1 of the specification with replacement paragraph 1.

Replacement paragraph 1:

This application claims priority to co-pending U.S. Patent Application Serial No. 12/880,924, filed on September 13, 2010, which claims priority to U.S. Provisional Patent Application Serial No. 61/241,479, filed on September 11, 2009, which is incorporated herein by reference in its entirety.

In the Claims:

Claims 1-20 have been cancelled. Claims 21-41 are new.

This listing of claims will replace all prior versions, and listing, of claims in the application:

1-20. (Canceled)

21. (New) A method for recovering zinc and manganese from a brine, the method comprising the steps of:

providing a brine, said brine comprising manganese and zinc;

selectively removing silica and iron from the brine to produce a substantially silica free brine;

adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed;

separating the zinc and manganese precipitates from the brine.

22. (New) The method of claim 21 wherein the precipitates of zinc and manganese are dissolved in an acid.

23. (New) The method of claim 21 wherein the precipitates of zinc and manganese are dissolved in ammonium sulfate.

24. (New) The method of claim 21 wherein the step of selectively removing silica and iron from the brine comprises providing iron (III) at a pH of between about 4.5 and 6 and precipitating the silica and iron from the brine.

25. (New) The method of claim 21 wherein the step of precipitating the zinc and manganese comprises adding sufficient base to adjust the pH to between 6 and 8 and providing an air oxidant to the substantially silica free brine.

26. (New) The method of claim 21 further comprising contacting the zinc with hydrochloric acid to produce zinc chloride.

27. (New) A method for recovering zinc and manganese from a brine, the method comprising the steps of:

providing a brine, said brine comprising manganese and zinc;

selectively removing silica and iron from the brine to produce a substantially silica free brine;

adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed;

separating the zinc and manganese precipitates from the brine;

dissolving the precipitates of zinc and manganese to produce a zinc manganese solution;

oxidizing the manganese to form a manganese precipitate and a zinc solution;

separating the manganese precipitate from the zinc solution;

recovering the zinc by electrochemical means.

28. (New) The method of claim 27 wherein the step of selectively removing silica and iron from the brine comprises providing iron (III) at a pH of between about 4.5 and 6 and precipitating the silica and iron from the brine.

29. (New) The method of claim 27 wherein the step of precipitating the zinc and manganese comprises adding sufficient base to adjust the pH to between 6 and 8 and providing an air oxidant to the substantially silica free brine.

30. (New) The method of claim 27 wherein the step of dissolving the zinc and manganese comprises providing a mineral acid sufficient to dissolve the zinc and manganese precipitate.

31. (New) The method of claim 27 wherein the step of recovering the zinc by electrochemical means comprises plating an electrode with zinc metal from the zinc solution.

32. (New) A method for recovering zinc and manganese from a brine, the method comprising the steps of:

providing a brine, said brine comprising manganese and zinc;

selectively removing silica and iron from the brine to produce a substantially silica free brine that includes manganese and zinc;
removing the zinc from the substantially silica free brine;
extracting manganese from the substantially silica free brine;
oxidizing the manganese to produce a manganese dioxide precipitate; and
recovering the magnesium dioxide precipitate.

33. (New) The method of claim 32 wherein the step of selectively removing silica and iron from the brine comprises providing iron (III) at a pH of between about 4.5 and 6 and precipitating the silica.

34. (New) The method of claim 32 wherein the zinc is removed from the substantially silica free brine by ion exchange.

35. (New) The method of claim 32 wherein the step of oxidizing the manganese to produce manganese dioxide comprises electrolytic deposition.

36. (New) A method for recovering zinc and manganese from a brine, the method comprising the steps of:

providing a brine, said brine comprising manganese and zinc;
selectively removing silica and iron from the brine to produce a substantially silica free brine that comprises manganese and zinc;
extracting manganese and zinc from the substantially silica free brine to produce a manganese zinc solution;
electrochemically removing manganese from the manganese zinc solution to produce a residual solution that includes zinc; and
electrochemically removing zinc from the residual solution.

37. (New) The method of claim 36 wherein the step of selectively removing silica and iron from the brine comprises providing iron (III) at a pH of between about 4.5 and 6 and precipitating the silica.

38. (New) The method of claim 36 wherein the step extracting manganese and zinc from the substantially silica free brine comprises extracting the manganese and zinc with a solvent selected from the group consisting of phosphines, phosphoric acids, and phosphinic acids.

39. (New) The method of claim 36 wherein the step of recovering the manganese by electrochemical means comprises plating an electrode with manganese metal from the manganese zinc solution.

40. (New) The method of claim 36 wherein the step of electrochemically removing the zinc means comprises plating an electrode with zinc metal from the zinc solution.

41. (New) A method for recovering zinc and manganese from a brine, the method comprising the steps of:

providing a brine, said geothermal brine comprising manganese and zinc;

selectively removing silica and iron from the brine to produce a substantially silica free brine that includes manganese and zinc;

removing the zinc from the substantially silica free brine;

extracting manganese from the substantially silica free brine.

Remarks:

Applicant has amended the specification for purposes of properly claiming priority for the presently pending continuation application.


Applicant has amended claims for the purpose of filing a continuation application. No new matter has been added.

Prior to examination of this application, please cancel claims 1-20 and consider claims 21-41 as presented on pages 3-6.

Should the Commissioner deem any fees as being due, including fees for extensions of time, the Commissioner is authorized to debit said fees from, or credit overpayments to, Bracewell & Giuliani LLP, USPTO Deposit Account Number 50-0259, Reference No. 076165.000097.

The Examiner is requested to contact the undersigned via telephone if a telephone conference would expedite or aid the prosecution and examination of this application.

Respectfully submitted,



Heather M. Khassian
Reg. No. 55,194
BRACEWELL & GIULIANI LLP
P.O. Box 61389
Houston, Texas 77208-1389
Telephone: (713) 221-1120
Facsimile: (800) 404-3970

Date: April 30, 2013

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	Selective Recovery of Manganese and Zinc From Geothermal Brines			
First Named Inventor/Applicant Name:	Stephen Harrison			
Filer:	Heather Megan Khassian/Debra Odum			
Attorney Docket Number:	076165.000097			
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	70	70
Utility Search Fee	2111	1	300	300
Utility Examination Fee	2311	1	360	360
Pages:				
Claims:				
Claims in excess of 20	2202	1	40	40
Independent Claims in Excess of 3	2201	2	210	420
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Late Filing Fee for Oath or Declaration	2051	1	70	70
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1260

Electronic Acknowledgement Receipt

EFS ID:	15654886
Application Number:	13874004
International Application Number:	
Confirmation Number:	8025
Title of Invention:	Selective Recovery of Manganese and Zinc From Geothermal Brines
First Named Inventor/Applicant Name:	Stephen Harrison
Customer Number:	35979
Filer:	Heather Megan Khassian/Debra Odum
Filer Authorized By:	Heather Megan Khassian
Attorney Docket Number:	076165.000097
Receipt Date:	30-APR-2013
Filing Date:	
Time Stamp:	17:01:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 1260
RAM confirmation Number	4810
Deposit Account	500259
Authorized User	SAMARDZIJA, MICHAEL

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

ESM / PETITIONER EX 1002-141

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	20130430ApplicationDataSheet.pdf	131344 8c2c676495f3b381ffc0687f8e2463c4655148aa	no	6

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2		20130430NonprovisionalContinuationApplication.pdf	1268871 71c5f6243205bf3d4109c880f6071e339e32748c	yes	43
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Document Description	Start	End
Specification	1	27
Claims	28	31
Abstract	32	32
Drawings-only black and white line drawings	33	43

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Applicant Arguments/Remarks Made in an Amendment	7	7

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4	Fee Worksheet (SB06)	fee-info.pdf	39747 6e0cd69d6eef9d1e7702b99c404bbe3a8f7f956e	no	2
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	076165.000097
		Application Number	
Title of Invention	Selective Recovery of Manganese and Zinc From Geothermal Brines		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

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Title of the Invention	Selective Recovery of Manganese and Zinc From Geothermal Brines		
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Subject Matter	Utility		
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Prior Application Status	Pending	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	12880924	2010-09-13
Prior Application Status	Expired	<input type="button" value="Remove"/>	

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	076165.000097
		Application Number	
Title of Invention	Selective Recovery of Manganese and Zinc From Geothermal Brines		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12880924	non provisional of	61241479	2009-09-13
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☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

Authorization to Permit Access:

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	076165.000097
		Application Number	
Title of Invention	Selective Recovery of Manganese and Zinc From Geothermal Brines		

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	076165.000097
		Application Number	
Title of Invention	Selective Recovery of Manganese and Zinc From Geothermal Brines		
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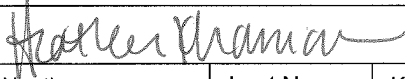
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	076165.000097
		Application Number	
Title of Invention	Selective Recovery of Manganese and Zinc From Geothermal Brines		

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PATENT APPLICATION

Inventor: Stephen Harrison

Samaresh Mohanta

Assignee: Simbol Mining Corp.

Atty Docket No.: 076165.000015

SELECTIVE RECOVERY OF MANGANESE AND ZINC FROM GEOTHERMAL BRINES

BACKGROUND OF THE INVENTION

Related Applications

[0001] This application claims priority to U.S. Provisional Patent Application Serial No. 61/241,479, filed on September 11, 2009, which is incorporated herein by reference in its entirety.

Technical Field of the Invention

[0002] This invention generally relates to the field of selectively removing manganese and zinc from brines. More particularly, the invention relates to methods for the selective removal and recovery of manganese and zinc geothermal brines that include zinc and manganese, preferably without the simultaneous removal of other ions from the brines.

Description of the Prior Art

[0003] Geothermal brines are of particular interest for a variety of reasons. First, geothermal brines provide a source of power due to the fact that hot geothermal pools are stored at high pressure underground, which when released to atmospheric pressure, can provide a flash-steam. The flash-stream can be used, for example, to run a power plant. Additionally, geothermal brines contain useful elements, which can be recovered and utilized for secondary processes. With some geothermal waters and brines, binary processes can be used to heat a

second fluid to provide steam for the generation of electricity without the flashing of the geothermal brine.

[0004] It is known that geothermal brines can include various metal ions, particularly alkali and alkaline earth metals, as well as silica, iron, lead, silver, zinc and manganese, in varying concentrations, depending upon the source of the brine. Recovery of these metals is potentially important to the chemical, pharmaceutical and electronics industries. Typically, the economic recovery of desired metals from natural brines, which may vary widely in composition, depends not only on the specific concentration of the desired metal, but also upon the concentrations of interfering ions, particularly silica, calcium and magnesium, because the presence of the interfering ions will increase recovery costs as additional steps must be taken to remove the interfering ions, before the desired metals are recovered.

[0005] One problem associated with geothermal brines when utilized for the production of electricity results from scaling and deposition of solids. Silica and other solids that are dissolved within the geothermal brine precipitate out during all stages of brine processing, particularly during the cooling of a geothermal brine, and may eventually result in fouling of the injection wells or processing equipment.

[0006] Although conventional processing of ores and brines currently employed can be used to recover a portion of the manganese and zinc present in geothermal brines, there still exists a need to develop economic methods that are selective for the removal and recovery of manganese and zinc from the brines at high yields and high purity.

SUMMARY OF THE INVENTION

[0007] Methods for the selective removal and recovery of manganese and zinc metals and compounds from geothermal brines are provided.

[0008] In a first embodiment, a method for recovering zinc and manganese ions from a geothermal brine is provided. The method includes the steps of: providing a geothermal brine that includes manganese and zinc ions; selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine; adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese as hydroxides and oxides, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed; separating the zinc and manganese precipitates from the brine; dissolving the precipitates of zinc and manganese to produce a zinc

manganese solution; oxidizing the manganese to form a manganese precipitate and a zinc solution; separating the manganese precipitate from the zinc solution; and recovering the zinc by electrochemical means.

[0009] In a second embodiment, a method for recovering zinc and manganese from a geothermal brine is provided. The method includes the steps of: providing a geothermal brine that includes manganese and zinc ions; selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine that includes manganese and zinc; removing the zinc from the substantially silica free brine by means of an ion exchange or other process; extracting manganese from the substantially silica free brine; oxidizing the manganese to produce a manganese dioxide precipitate; and recovering the magnesium dioxide precipitate. In certain embodiments, the process can include the recycling of various solutions to dissolve manganese and zinc precipitates.

[0010] In a third embodiment, a method for recovering zinc and manganese from a geothermal brine is provided. The method includes the steps of: providing a geothermal brine that includes manganese and zinc; selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine that includes manganese and zinc; extracting manganese and zinc from the substantially silica free brine to produce a manganese zinc solution; electrochemically removing manganese as manganese metal or manganese dioxide from the manganese zinc solution to produce a residual solution that includes zinc; and electrochemically removing zinc from the residual solution. In certain embodiments, the manganese dioxide and zinc can be recovered in a single electrochemical cell.

[0011] In a fourth embodiment of the invention, a method for recovering zinc and manganese from a geothermal brine is provided. The method includes the steps of: providing a geothermal brine that includes manganese and zinc; selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine that includes manganese and zinc; adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed; separating the zinc and manganese precipitates from the brine; dissolving the precipitates of zinc and manganese to produce a zinc manganese solution; extracting zinc by solvent extraction; recovering and oxidizing the manganese to form a manganese dioxide precipitate and a zinc solution;

separating the manganese precipitate from the zinc solution; and recovering the zinc by electrochemical means. In certain embodiments, the oxidation of the manganese is by chemical means. In alternate embodiments, the oxidation of manganese is by electrochemical means.

[0012] In a fifth embodiment of the invention, a method for recovering zinc and manganese from a geothermal brine is provided. The method includes the steps of: providing a geothermal brine that includes manganese and zinc; selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine that includes manganese and zinc; adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed; separating the zinc and manganese precipitates from the brine; dissolving the precipitates of zinc and manganese to produce a zinc manganese solution; extracting manganese by solvent extraction and then recovering manganese; recovering and oxidizing the dissolved manganese to form a manganese dioxide precipitate and a zinc solution; and recovering the zinc by electrochemical means. In certain embodiments, the recovery of manganese is by oxidation of the manganese is by chemical means. In alternate embodiments, the oxidation of manganese is by electrochemical means. In further embodiments, manganese is recovered by electrochemical reduction.

[0013] In a sixth embodiment of the invention, a method for recovering zinc and manganese from a geothermal brine is provided. The method includes the steps of: providing a geothermal brine that includes manganese and zinc; selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine that includes manganese and zinc; adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed; separating the zinc and manganese precipitates from the brine; dissolving the precipitates of zinc and manganese to produce a zinc manganese solution; extracting by way of a double solvent extraction both zinc and manganese in two separate streams; recovering and oxidizing the dissolved manganese to form a manganese dioxide precipitate and a zinc solution; and recovering the zinc by electrochemical means. In certain embodiments, the oxidation of the manganese is by chemical means. In alternate embodiments, the oxidation of manganese is by electrochemical means.

[0014] In a seventh embodiment of the invention, a method for recovering zinc and manganese from a geothermal brine is provided. The method includes the steps of: providing a geothermal brine that includes manganese and zinc; selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine that includes manganese and zinc; adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese as hydroxides and oxides, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed; separating the zinc and manganese precipitates from the brine; dissolving the precipitates of zinc and manganese to produce a zinc manganese solution; extracting by way of a double solvent extraction both zinc and manganese in two separate streams; recovering and reducing the dissolved manganese to form a manganese metal electrolytically and a zinc solution; and recovering the zinc by electrochemical means.

[0015] In an eighth embodiment of the invention, a method for recovering zinc and manganese from a geothermal brine is provided. The method includes the steps of: providing a geothermal brine that includes manganese and zinc; selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine that includes manganese and zinc; adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed; separating the zinc and manganese precipitates from the brine; dissolving the precipitates of zinc and manganese to produce a zinc manganese solution; extracting by way of a double solvent extraction both zinc and manganese in two separate streams; reacting the manganese stream to produce a manganese salt; and reacting the zinc stream to produce a zinc salt. In certain embodiments, the manganese salt is selected from manganese carbonate, manganese sulfate, and a manganese halide. In certain embodiments, the zinc salt is selected from zinc carbonate, zinc sulfate, or a zinc halide.

[0016] In a ninth embodiment of the invention, a method for recovering zinc and manganese from a geothermal brine is provided. The method includes the steps of: providing a geothermal brine that includes manganese and zinc; selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine that includes manganese and zinc; recovering zinc by contacting the substantially silica free brine with an ion exchange resin, and recovering manganese from the solution by electrolytically depositing manganese dioxide from the substantially silica free brine. Optionally, following removal of the zinc and

manganese, the remaining brine solution can be recycled to the step for recovering zinc by contacting with the ion exchange resin. In an alternate embodiment, the ion exchange resin is a basic anionic exchange resin.

[0017] In a tenth embodiment, a method for recovering zinc and manganese from a geothermal brine is provided. The method includes the steps of: providing a geothermal brine that includes manganese and zinc; selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine that includes manganese and zinc. The method includes adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed, and separating the manganese and zinc precipitates from the brine. The method further includes dissolving the precipitates of zinc and manganese in an acid to produce a zinc and manganese containing acid solution and extracting the zinc and manganese containing acid solution with an extraction solvent to produce a first liquid phase that includes the extraction solvent and zinc and a second liquid phase that includes manganese. The first and second liquid phases are separated and then zinc is electrochemically recovered from the first liquid phase. The second liquid phase is reduced to form Mn^{2+} and the second liquid phase is supplied to an electrochemical cell and manganese is recovered by electrochemical means.

[0018] In an eleventh embodiment, a method for recovering zinc and manganese from a geothermal brine is provided. The method includes the steps of: providing a geothermal brine that includes manganese and zinc; selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine that includes manganese and zinc. The method includes adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed, and separating the manganese and zinc precipitates from the brine. The method further includes dissolving the precipitates of zinc and manganese in ammonium sulfate to produce a zinc and manganese containing ammonium sulfate solution and extracting the zinc and manganese containing ammonium sulfate solution with an extraction solvent to produce a first liquid phase that includes the extraction solvent and zinc and a second liquid phase that includes manganese and ammonium sulfate. The first and second liquid phases are separated and then zinc is electrochemically recovered from the first liquid phase. The second liquid phase is reduced to form Mn^{2+} and the second liquid phase is supplied to an electrochemical cell and manganese is recovered by electrochemical means.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] Figure 1 illustrates a process for the recovery of manganese and zinc from a geothermal brine according to one embodiment of the invention.

[0020] Figure 2 illustrates another process for the recovery of manganese and zinc from a geothermal brine according to another embodiment of the invention.

[0021] Figure 3 illustrates another process for the recovery of manganese and zinc from a geothermal brine according to another embodiment of the invention.

[0022] Figure 4 illustrates another process for the recovery of manganese and zinc from a geothermal brine according to another embodiment of the invention.

[0023] Figure 5 illustrates another process for the recovery of manganese and zinc from a geothermal brine according to another embodiment of the invention.

[0024] Figure 6 illustrates another process for the recovery of manganese and zinc from a geothermal brine according to another embodiment of the invention.

[0025] Figure 7 illustrates another process for the recovery of manganese and zinc from a geothermal brine according to another embodiment of the invention.

[0026] Figure 8 illustrates another process for the recovery of manganese and zinc from a geothermal brine according to another embodiment of the invention.

[0027] Figure 9 illustrates another process for the recovery of manganese and zinc from a geothermal brine according to another embodiment of the invention.

[0028] Figure 10 illustrates another process for the recovery of manganese and zinc from a geothermal brine according to another embodiment of the invention.

[0029] Figure 11 illustrates another process for the recovery of manganese and zinc from a geothermal brine according to another embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0030] Broadly, described herein are methods for the selective removal of manganese and zinc from solution. As used herein, the selective removal of manganese and zinc generally refers to methods to facilitate the removal of manganese and zinc from solutions that include

manganese and zinc, such as geothermal brines, without the removal of other ions. Generally, in certain embodiments, the methods employ chemical means for the separation of manganese and zinc from brines. In certain embodiments, the methods may include physical means, as well as chemical means, for the separation of manganese and zinc from brines.

[0031] As used herein, "brine" or "brine solution" refers to any aqueous solution that contains a substantial amount of dissolved metals, such as alkali and/or alkaline earth metal salt(s) in water, wherein the concentration of salts can vary from trace amounts up to the point of saturation. As used herein, brine refers to both geothermal brines and waste or byproduct streams from industrial processes.

[0032] Generally, brines suitable for the methods described herein are aqueous solutions that may include alkali metal or alkaline earth chlorides, bromides, sulfates, hydroxides, nitrates, and the like, as well as natural brines. In certain brines, metals may be present. Exemplary elements present in the geothermal brines can include sodium, potassium, calcium, magnesium, lithium, strontium, barium, iron, boron, silica, manganese, chlorine, zinc, aluminum, antimony, chromium, cobalt, copper, lead, arsenic, mercury, molybdenum, nickel, silver, thallium, vanadium, and fluorine, although it is understood that other elements and compounds may also be present. Brines can be obtained from natural sources, such as, Chilean brines or Salton Sea brines, geothermal brines, sea water, mineral brines (e.g., lithium chloride or potassium chloride brines), alkali metal salt brines, and industrial brines, for example, industrial brines recovered from ore leaching, mineral dressing, and the like. The method is also equally applicable to artificially prepared brine or salt solutions.

[0033] As shown in Figure 1, process 100 of the present invention first removes silica and iron from the brine solution in an iron/silica removal step 110. In certain embodiments, the iron and silica removal step preferably removes only the iron and silica, while at the same time leaving all other metals and/or ions present in the brine undisturbed. The removal of silica is an important step as the presence of silica can interfere with subsequent processes for the recovery of various other metals. For example, silica frequently clogs pores in filtration media.

[0034] One preferred method for the selective removal of silica and iron includes contacting the solution with iron (III) hydroxide at a pH of between about 4.5 and 6, preferably between about 4.75 and 5.5, more preferably between about 4.9 and 5.3.

[0035] Typically, brine will have an iron (II) salt present naturally. In other embodiments, an iron (II) salt or iron (III) hydroxide can be added to the brine to achieve a certain concentration of iron (II) salt or iron (III) hydroxide relative to the silica or silicon containing compounds present in the brine. In certain embodiments, the molar ratio of the iron (II) salt or iron (III) hydroxide to silica is at least 1:1, preferably at least 4:1, more preferably at least 7:1 and even more preferably at least 10:1.

[0036] When the iron in the brine or silica containing solution is iron (II), for example iron (II) chloride, an oxidant is added to oxidize iron (II) salt to iron (III) hydroxide. The preferred oxidant is air. Thus, in one preferred embodiment, the iron (II) salt present in the brine can be oxidized to iron (III) by sparging the reaction vessel with air. While it is understood that many different oxidants can be used for the oxidation of iron (II) to iron (III), the use of oxygen or air as the oxidant in the pH range of between 4 and 7 is selective for the oxidation of the iron (II) salt to iron (III) hydroxide, and generally does not result in the precipitation or oxidation of other elements or compounds that are present in the brine. Control of the pH of the solution can be achieved with the addition of base (e.g., calcium hydroxide, calcium oxide or the like). As noted previously, it is preferred that the pH is maintained between 4.5 and 6.

[0037] Other exemplary oxidants can include hypohalite compounds, such as hypochlorite, hydrogen peroxide (in the presence of an acid), air, halogens, chlorine dioxide, chlorite, chlorate, perchlorate and other analogous halogen compounds, permanganate salts, chromium compounds, such as chromic and dichromic acids, chromium trioxide, pyridinium chlorochromate (PCC), chromate and dichromate compounds, sulfoxides, persulfuric acid, nitric acid, ozone, and the like. It will be recognized by those skilled in the art that iron (III) hydroxide may also have a significant affinity for arsenic (III) and (V) oxyanions, and these anions, if present in the brine, may be co-deposited with the silica on the iron (III) hydroxide.

[0038] In another embodiment, iron (III) hydroxide can be produced by adding a solution of iron (III) chloride to the brine, which on contact with the more neutral brine solution, will precipitate as iron (III) hydroxide. The brine may require neutralization, such as through the addition of base to initiate precipitation of the iron (III) hydroxide.

[0039] The iron (III) hydroxide contacts the silica present in the brine and forms a precipitate. Without being bound to any specific theory, it is believed that the silica or silicon containing compound attaches to the iron (III) hydroxide. In certain embodiments, the ratio

of iron (III) to silica is at least about 1:1, more preferably at least about 4:1. The reaction of the iron (III) hydroxide with silica is capable of removing at least about 80% of the silica present, preferably at least about 90%, and more preferably at least about 95%, and typically depends upon the amount of iron (III) hydroxide present in the solution.

[0040] In certain embodiments, the iron (II) salt containing solution can be sparged with air for a period of at least 15 min., preferably at least 30 min., followed by the addition of a base, such as calcium oxide, calcium hydroxide, sodium hydroxide, or the like, to achieve the desired pH for the solution.

[0041] After silica and iron removal step 110, in precipitation step 120, a base (e.g., calcium oxide, calcium hydroxide or the like) is added to the brine to adjust or maintain a pH of the brine at greater than at least about 6, preferably between about 6 and 8.5, more preferably between about 6.5 and 8. In alternate embodiments, the pH is maintained at about 7. In certain embodiments, the pH is maintained at less than about 9. The base may be in solution or slurry form. Furthermore, the solution is exposed to an oxygen source and manganese and zinc precipitates are formed. In certain embodiments, depending upon the pH of the solution, a lead precipitate may also be formed. To achieve oxidation of the manganese, air is preferably supplied to the solution by sparging or bubbling. Other oxidants suitable for the oxidation of the manganese can include hypohalites, hydrogen peroxide, and ozone.

[0042] The solids in the brine and base, which solids can include at least manganese and zinc, are separated from the remainder of the mixture, which retains the majority of ions present in the brine. Separation of the solids can be done by conventional filtration means and can optionally include centrifugation or other known techniques for concentration the solids. In certain embodiments, the remaining brine solution from which the manganese and zinc have been removed can then be reinjected into the geothermal well from which the brine was originally removed.

[0043] The manganese and zinc solids that are separated from the remaining brine solution can then be dissolved in an acid solution in step 130. Preferred acids include strong mineral acids, such as hydrochloric acid, sulfuric acid, methanesulfonic acid, and the like. In certain embodiments, lead and/or calcium precipitates may be formed during the precipitation of the manganese and zinc. In these embodiments, the selected acid is preferably sulfuric acid, as sulfuric acid is selective for manganese and zinc precipitates, and does not dissolve the lead and/or calcium precipitates that may be present. The acid is preferably added to the solids in

greater than approximately a 1:1 molar ratio to the solids. In certain embodiments, it may be beneficial to minimize the amount of excess acid that is utilized for dissolving the manganese and zinc precipitates, for ease of performance of downstream processes, as well as for economic and environmental considerations. In certain embodiments, the solids and acid are mixed to ensure complete dissolution of the solids.

[0044] The acid and dissolved metal solution is then filtered to remove remaining solids, if any, and the solution may then be purified in optional purification step 140 to remove trace metals, which may be present in the acidified solution. It is believed that metals, such as copper, cadmium, nickel, antimony and/or cobalt, as well as other metals or ions, may be present in trace amounts in the acid and dissolved metal solution. These trace metals may interfere with the subsequent separation of manganese and zinc. Purification of the acid and dissolved metal solution can be achieved by known means, such as ion exchange or by treatment with zinc dust. Zinc dust operates by first displacing other more noble metals from solution and allowing them to precipitate on undissolved zinc dust. For example, copper ions present in the solution will precipitate as copper metal or will deposit on undissolved zinc dust.

[0045] Manganese and zinc can be extracted from the acid and dissolved metal solution using solvent extraction techniques. Suitable solvents for the extraction of manganese and zinc include phosphines, phosphoric acids, and phosphinic acids, such as the following: di(2-ethylhexyl)phosphoric acid (DEHPA) in kerosene or Cyanex® 272 (bis(2,4,4-trimethylpentyl)phosphinic acid); Ionquest 290 (available from Rhodia Inc.) in aliphatic kerosene or the highly branched carboxylic acid extractant (versatic 10)(10-decyl-4-pyridinecarboxylate). In certain embodiments, DEHPA is a suitable extraction solvent, particularly in embodiments where iron has been previously removed.

[0046] Other exemplary solvents that may be used for the extraction of zinc are discussed in U.S. Pat. No. 5,135,652, the disclosure of which is herein incorporated by reference in its entirety. These exemplary solvents include mono-2-ethylhexylphosphoric acid (M2EHPA), di-2-ethylhexylphosphoric acid (D2EHPA), and mixtures thereof (EHPA). Other exemplary solvents include bis-2,4,4-trimethylpentylmonothiophosphinic acid (Cyanex® 302) and bis-2,4,4-trimethylpentyldithiophosphinic acid (Cyanex® 301). In certain embodiments, the extractant includes both phosphoric acid and phosphinic acid. In certain embodiments, the ratio of phosphoric acid to phosphinic acid is greater than about 1:1, preferably between

about 1:1 and 1:6. In certain embodiments, the extractant can be diluted with a hydrocarbon solvent, preferably a dearomatized aliphatic hydrocarbon. Exemplary diluents include Exxsol™ D80.

[0047] The pH during the extraction is maintained at less than about 7, preferably between about 1 and 5, more preferably in the range of about 1.5 to 3.5.

[0048] Other solvents suitable for the extraction of zinc from brine solutions are described in "Recovery of Zinc(II) from Acidic Sulfate Solutions. Simulation of Counter-Current Extraction Stripping Process", Gotfryd, L. and Szymanowski, J.; Physicochemical Problems of Mineral Processing, vol. 38 (2004), pp. 113-120; "New Developments in the Boleo Copper-Cobalt-Zinc-Manganese Project", Dreisinger, et al.; available at http://bajamining.com/resources/Reports/alta_paper_2006_boleo_final.pdf; "Zinc Solvent Extraction in the Process Industries", Cole, P. and Sole, K.; Mineral Processing and Extractive Metallurgy Review, vol. 24, no. 2 (2003), pp. 91-137; "Solvent extraction of zinc(II) and manganese(II) with 5,10,15,20-tetraphenyl-21H,23H-porphine(TPP) through the metal exchange reaction of lead(II)-TPP", Kawai, T., Fujiyoshi, R., and Sawamura, S.; Solvent Extr. Res. Dev. Japan, vol. 7 (2000), pp. 36-43, "Solvent Extraction of Zinc from Strong Hydrochloric Acid Solution with Alamine336", Lee, M. and Nam, S.; Bull. Korean Chem. Soc., vol. 30, no. 7 (2009), pp. 1526-1530, the disclosures of which are incorporated herein by reference.

[0049] Manganese can be isolated by electrolysis or, in step 150, by oxidation to produce manganese dioxide, or by precipitation as a carbonate by reaction with sodium carbonate. In certain preferred embodiments, manganese can be selectively isolated from zinc as manganese dioxide by electrolysis in a sulfate solution, at an anode made of metals, such as titanium or carbon. Alternatively, selective oxidation of manganese to manganese dioxide can be achieved utilizing an oxidant, such as chlorine, hydrogen peroxide, or the like to provide solid manganese dioxide and zinc containing solution. In step 160, precipitated manganese dioxide is separated from the zinc containing solution by known means, such as filtration, centrifugation, or a like process.

[0050] In an alternate embodiments, manganese dioxide can be generated at the anode of a divided electrochemical cell by the oxidation of manganese (II) and manganese (III) to generate a manganese dioxide deposited on the surface of the electrode. After the solution is passed through anode compartment, it is then fed to the cathode compartment where zinc

metal is electrodeposited. The current density ranges from between about 50 to about 500 A/m². The separator, such as an ion exchange membrane or a porous material that allows the passage of liquids, positioned between the anode and cathode assists in preventing deposition of manganese dioxide on the zinc metal. In certain embodiments, the separator can include a series of baffles. In certain embodiments, it may be advantageous to remove solid manganese dioxide from the electrolytic stream formed in the anode compartment that may be lost from the surface of the anode, such as by filtration, prior to supplying to the cathode compartment. Production of manganese dioxide by electrochemical means and the recovery of zinc metal by electrowinning preferably includes a conductive solution, such as sulfate, chloride, methanesulfonate, or the like, for improved efficiency. In certain embodiments, it is preferred that the electrochemical cell includes a small amount of free acid in the solution. In alternate embodiments, the electrochemical cell can be operated at a pH ranging from about 0 to 2. Following recovery of the manganese and zinc, the respective solutions can be recycled to the solvent extraction step. Alternatively, the respective solutions can be recycled to the acid solution.

[0051] The zinc containing solution can then be optionally purified in step 170 and then supplied to an electrochemical cell for electrochemical recovery in step 180 by electrowinning (also known as electroextraction). Electrowinning utilizes an electrochemical cell wherein a current is passed from an inert anode, such as lead dioxide, iridium dioxide coated titanium, or other stable substrate, through the zinc containing solution, leading to deposition of the zinc on the cathode. The base cathode can be aluminum, although other metals, such as steel, stainless steel, and titanium, can also be used. The cathode material is selected based upon chemical stability, electrical conductivity, and the ease of removal of zinc from substrate.

[0052] Alternatively, in the process illustrated by Figure 1, the steps for the isolation and recovery of manganese and zinc can be reversed, i.e., the zinc can be separated and isolated from a solution that includes zinc and manganese by electrowinning, followed by the isolation of manganese by either electrowinning or oxidation of the manganese to produce manganese dioxide.

[0053] Optionally, the process may include a step for the recovery of lithium from the geothermal brine. Methods for the recovery are known in the art, such as is described in U.S. Pat. Nos. 4,116,856; 4,116,858; 4,159,311; 4,221,767; 4,291,001; 4,347,327; 4,348,295;

4,348,296; 4,348,297; 4,376,100; 4,430,311; 4,461,714; 4,472,362; 4,540,509; 4,727,167; 5,389,349; 5,599,516; 6,017,500; 6,280,693; and 6,555,078, each of which is incorporated herein by reference in their entirety. Alternatively, methods can be employed utilizing a lithium aluminate intercalate/gibbsite composite material, a resin based lithium aluminate intercalate, and/or a granulated lithium aluminate intercalate. The gibbsite composite is a lithium aluminate intercalate that is grown onto an aluminum trihydrate core. The resin-based lithium aluminate intercalate is formed within the pores of a macroreticular ion exchange resin. The granulated lithium aluminate intercalate consists of fine-grained lithium aluminate intercalate produced by the incorporation of a small amount of inorganic polymer. The process of contacting the lithium aluminate intercalate material with the geothermal brine is typically carried out in a column that includes the extraction material. The geothermal brine is flowed into the column and lithium ions are captured on the extraction material, while the water and other ions pass through the column. After the column is saturated, the captured lithium is removed by flowing water having a small amount of lithium chloride present through the column. In preferred embodiments, multiple columns are employed for the capture of the lithium.

[0054] In another embodiment of the present invention, in process 200 provided in Figure 2, iron and silica are first removed from the geothermal brine in step 210. Methods for the removal of silica and iron include those methods previously described with respect to Figure 1, and preferably include oxidation of the iron from iron (II) to iron (III), and the control of the pH of the solution with the addition of a base. Preferably, the iron is oxidized with air, and the pH is controlled by the addition of a base, such as calcium oxide or calcium hydroxide, or like compound.

[0055] The brine solution, now having a reduced concentration of silica and iron relative to the initial brine feed, can be supplied to zinc removal process 220 that can include an ion exchange process, for example a basic anionic ion exchange resin like the chloride of a quaternary amine divinylbenzene/styrene copolymer, or the chloride of trimethylamine functionalized chloromethylated copolymer of styrene and divinylbenzene, such as is described in U.S. Pat. Nos. 6,458,184, which is incorporated herein by reference in its entirety. Zinc separated by ion exchange, existing as zinc chloride or a zinc chloride anions, can then be converted into a saleable zinc product, such as zinc metal or zinc oxide. In certain embodiments, the remaining brine solution from which the manganese and zinc have

been removed can then be reinjected into the geothermal well from which the brine was originally removed.

[0056] The remaining solution, which includes manganese, can then optionally be supplied to purification step 230 and purified by ion exchange, solvent extraction, or like process, and the manganese containing phase can be provided to oxidation step 240, such as an electrochemical cell or chemical oxidation process, as described with respect to Figure 1, to facilitate the recovery of manganese dioxide. Purified manganese can be collected in step 250 by filtration. As shown with the dashed line, the liquid phase from step 250 can optionally be recycled to manganese extraction step 230. As previously discussed, following recovery of the manganese and zinc, the respective solutions can be recycled to the solvent extraction step. Alternatively, the respective solutions can be recycled to the acid solution.

[0057] As noted with respect to Figure 1, in process 200 the lithium can optionally be removed from the brine solution at any point during the process by the means discussed above.

[0058] In yet another embodiment, in process 300 shown in Figure 3, a method for the separation and isolation of manganese and zinc from a brine is provided. As noted with respect to Figures 1 and 2, the first step of the process includes the removal of iron and silica from the brine solution in step 310. Preferably, as discussed above, the iron is oxidized and base is added to the solution to control the pH. Preferably, iron is oxidized with air, and the base is calcium oxide, calcium hydroxide, or a like compound.

[0059] Following removal of a major portion of the silica and iron, the manganese and zinc can be removed by liquid-liquid extraction step 320. Exemplary liquids suitable for the extraction of manganese and zinc are described in U.S. Pat. No. 6,458,184 and U.S. Pub. Pat. App. No. 20030226761, the disclosures of which are incorporated herein by reference in their entirety. The solvents can include, for example, water-immiscible cationic organic solvents, such as di-(2-ethylhexyl) phosphoric acid (D2EHPA), and other similar solvents, as known in the art. In certain embodiments, the remaining brine solution from extraction step 320, from which the manganese and zinc have been removed, can then be reinjected into the geothermal well from which the brine was originally removed.

[0060] Following the liquid-liquid extraction step, the extraction solution that includes the manganese and zinc can be provided to one or more purification steps 330. Purification steps

330 preferably operable to remove calcium and other divalent cations, as well as some metals, such as copper, cadmium, cobalt, molybdenum, and nickel, although the purification steps are not limited to these metals.

[0061] Following purification step 330, the manganese and zinc can be isolated in steps 340 and 350, respectively. Specifically, as previously discussed, manganese dioxide and zinc can each separately be produced from solution by electrowinning. In one embodiment, zinc is recovered first, followed by manganese. In an alternate embodiment, manganese is recovered first, followed by zinc. In certain embodiments, the pH is maintained at less than about 3.5 during the electrowinning process. In alternate embodiments, the temperature is maintained at less than about 60°C during the electrowinning process. In certain embodiments, the pH of the solution supplied to manganese electrochemical recovery step 340 is about 5, and the pH of the solution exiting the electrochemical cell is about 1. The pH of the solution supplied to zinc electrochemical recovery step 350 is about 1.

[0062] In an alternate embodiment, the solution from purification step 330 can be supplied to a single electrochemical recovery step 360 wherein zinc and manganese can be deposited simultaneously as zinc oxide and manganese dioxide.

[0063] As previously discussed, following recovery of the manganese and zinc, the respective solutions can be recycled to either the solvent extraction step or to the acid solution. In certain embodiments, as shown by the dashed line, the solution from zinc electrochemical recovery step 350 can be recycled to purification step 330.

[0064] In another embodiment, as provided in Figure 4, process 400 for the recovery of manganese or zinc from a geothermal brine is provided. As previously discussed, with respect to Figure 1, first step 410 of process 400 includes the removal of iron and silica from the brine solution. In certain embodiments, the iron is oxidized and base is added to control the pH of the solution. In certain embodiments, iron is oxidized with air and the base is calcium oxide or calcium hydroxide, or like compound.

[0065] Following the removal of the iron and silica, in precipitation step 420, additional base, such as lime, slaked lime, limestone, sodium hydroxide, and the like, is added to achieve a pH of between about 6 and 9, preferably up to about 8 when sparged with air, or up to about 9 when it is not sparged with air, to facilitate the precipitation of manganese and zinc. The manganese and zinc precipitates are collected by known means and dissolved in an acid

solution in step 430, as previously discussed herein. In certain embodiments, the remaining brine solution from extraction step 420, from which the manganese and zinc have been removed, can then be reinjected into the geothermal well from which the brine was originally removed.

[0066] Optionally, the acid solution, which includes the manganese and zinc, can be purified in step 440, to remove trace metal impurities, such as heavy metals, for example, cobalt, copper, cadmium, nickel, and the like. The acid solution is then extracted in step 450 to recover zinc, as previously provided. Thus, following extraction, a first solution, which includes zinc and the extraction solvent, is produced and a second solution, which includes manganese, is produced.

[0067] The zinc can then be recovered by electrochemical means in step 460, such as by electrowinning or a like process, as previously discussed. Manganese can be recovered by first oxidizing the manganese in step 470 to produce manganese dioxide, as previously discussed, which can then be recovered electrochemically in step 480 by known means. As previously discussed, as shown by the dashed lines, following recovery of the manganese and zinc, the solutions from steps 460 and 480 can be recycled to solvent extraction step 450 or to the acid solution of dissolution step 430, respectively.

[0068] In another embodiment, as provided in Figure 5, process 500 for the recovery of manganese or zinc from a geothermal brine is provided. As previously discussed, first step 510 of the process includes the removal of iron and silica from the brine solution. In certain embodiments, the iron is oxidized and base is added to control the pH of the solution. In certain embodiments, iron is oxidized with air and the base is calcium oxide or calcium hydroxide.

[0069] Following the removal of the iron and silica, in precipitation step 520, additional base to adjust the pH to at least about 6 is added to facilitate the precipitation of manganese and zinc. The manganese and zinc precipitates are collected by known means, such as by filtration, centrifugation, or a like process, and dissolved in an acid solution in step 530, as previously discussed herein. Optionally, the acid solution, which includes the manganese and zinc, can be purified. In certain embodiments, the remaining brine solution from extraction step 520, from which the manganese and zinc have been removed, can then be reinjected into the geothermal well from which the brine was originally removed.

[0070] The acid solution from step 530 can then be extracted in extraction step 540 to recover manganese and zinc, as previously provided, to provide an extract solution that includes both manganese and zinc. The manganese in the extract solution can be oxidized in step 550 to produce manganese dioxide, which can then be separated by filtration or other known means in step 560. Zinc remaining in the extract solution can then be recovered in step 570 by electrochemical means, such as electrowinning or a like process. In certain embodiments, as shown by the dashed line, the solution from zinc electrochemical recovery step 570 can be recycled to the dissolution step 530.

[0071] In another embodiment, as provided in Figure 6, process 600 for the recovery of manganese or zinc from a geothermal brine is provided. As previously discussed, first step 610 of the process includes the removal of iron and silica from the brine solution. In certain embodiments, the iron is oxidized and base is added to control the pH of the solution, preferably to at least about 5 and up to about 6. In certain embodiments, iron is oxidized with air and the base is calcium oxide or calcium hydroxide.

[0072] Following the removal of the iron and silica, in precipitation step 620, additional base is added to achieve a pH of at least about 6 to cause the precipitation of manganese and zinc. The manganese and zinc precipitates are collected by known means in step 630 and dissolved in an acid solution in step 640, as previously discussed herein. Optionally, the acid solution, which includes the manganese and zinc, can be purified. In certain embodiments, the remaining brine solution from extraction step 630, from which the manganese and zinc have been removed, can then be reinjected into the geothermal well from which the brine was originally removed.

[0073] The acid solution from step 640 is then subjected to a double extraction step 650, wherein the acid solution is contacted with two separate extraction solvents to recover two separate streams, wherein recovery step 670 recovers a first stream that includes manganese and a second stream is recovered includes zinc. Appropriate extraction solvents for the extraction of manganese and zinc have been previously discussed. The manganese in the first stream can be oxidized in oxidation step 680 to produce manganese dioxide, which is then separated by filtration or other known means. The zinc in the second stream can be recovered by electrochemical means, such as electrowinning, in step 660. As previously discussed, as shown by the dashed lines, following recovery of the zinc and manganese in

steps 660 and 680, the respective solutions can be recycled to solvent extraction step 650 or to manganese stream recovery step 670, respectively.

[0074] In another embodiment, as provided in Figure 7, process 700 for the recovery of manganese or zinc from a geothermal brine is provided. As previously discussed, a first step of the process includes the removal of iron and silica from the brine solution. In certain embodiments, the iron is oxidized and base is added to control the pH of the solution to about 5 and 6. In certain embodiments, iron is oxidized with air and the base is calcium oxide or calcium hydroxide.

[0075] Following the removal of the iron and silica, in precipitation step 720, additional base is added to achieve a pH of between about 6 and 9, preferably up to about 8 when sparged with air, or up to about 9 when it is not sparged with air, to facilitate the precipitation of manganese and zinc. The manganese and zinc precipitates are separated from a liquid phase in step 730, collected by known means, such as filtration, centrifugation or a like process, and dissolved in an acid solution in step 740, as previously discussed herein. Optionally, the acid solution, which includes the manganese and zinc, can be purified. In certain embodiments, the remaining brine solution from extraction step 730, from which the manganese and zinc have been removed, can then be reinjected into the geothermal well from which the brine was originally removed.

[0076] The acid solution from step 740 is then subjected to double extraction step 750, wherein the acid solution is contacted with two separate extraction solvents to recover two separate streams, wherein the first stream recovered in step 770 includes manganese, and wherein the second stream includes zinc. Appropriate extraction solvents for the extraction of manganese and zinc have been previously discussed. The manganese in the first stream can be electrolytically reduced in step 780, as is known in the art, to produce manganese metal. The zinc in the second stream can be recovered by electrochemical means in step 760, such as by electrowinning or a like process. As previously discussed, as shown by the dashed line, following recovery of the zinc and manganese in steps 760 and 780, the respective solutions can be recycled to the solvent extraction step 750 or to manganese stream recovery step 770, respectively. In certain embodiments, as shown by the dashed line, at least a portion of the non-extraction solvent solution from extraction step 750 can be recycled to dissolution step 740.

[0077] In another embodiment, as provided in Figure 8, process 800 for the recovery of manganese or zinc from a geothermal brine is provided. As previously discussed, a first step of the process includes the removal of iron and silica from the brine solution. In certain embodiments, the iron is oxidized and base is added to control the pH of the solution to between about 4.5 and 6, preferably between about 4.75 and 5.5. In certain embodiments, iron is oxidized with air and the base is calcium oxide or calcium hydroxide.

[0078] Following the removal of the iron and silica, in precipitation step 820, additional base is added to achieve a pH of between about 6 and 9, preferably up to about 8 when sparged with air, or up to about 9 when it is not sparged with air, to facilitate the precipitation of manganese and zinc. The manganese and zinc precipitates are separated and collected by known means in step 830, such as by filtration, centrifugation or a like process, and dissolved in an acid solution, as previously discussed herein. Optionally, the acid solution that includes the manganese and zinc can be purified. In certain embodiments, the remaining brine solution from extraction step 830, from which the manganese and zinc have been removed, can then be reinjected into the geothermal well from which the brine was originally removed.

[0079] The acid solution is then subjected to a double extraction in step 840, wherein the acid solution is contacted with two separate extraction solvents to recover two separate streams, wherein the first stream includes manganese and the second stream includes zinc. Appropriate extraction solvents for the extraction of manganese and zinc have been previously discussed. The manganese in the first stream can be reacted in step 850 with an acid, such as sulfuric acid, hydrochloric acid, hydrobromic acid, or a like acid to produce a manganese salt, which can then be recovered by precipitation in step 860. The zinc in the second stream can be recovered by electrochemical means, such as electrowinning or like means, or may also be reacted in step 870 with an acid, such as sulfuric acid, hydrochloric acid, hydrobromic acid, or a like acid to produce a salt solution and recovered in step 880 by precipitation, evaporative crystallization, spray drying, or a like process. As previously discussed, as shown by the dashed line, following recovery of the manganese and zinc salts in steps 860 and 880, the respective solutions can be recycled to solvent extraction step 840.

[0080] In another embodiment, as shown in Figure 9, process 900 for the recovery of manganese or zinc from a geothermal brine is provided. As previously discussed, first step 910 of the process includes the removal of iron and silica from the brine solution. In certain embodiments, the iron is oxidized and base is added to control the pH of the solution to

between about 4.5 and 6, preferably between about 4.75 and 5.5. In certain embodiments, iron is oxidized with air and the base is calcium oxide or calcium hydroxide.

[0081] Following the removal of the iron and silica, in precipitation step 920 additional base is added to achieve a pH of between about 6 and 9, preferably up to about 8 when sparged with air, or up to about 9 when it is not sparged with air, to facilitate the precipitation of manganese and zinc. The manganese and zinc precipitates are separated in step 930, collected by known means and dissolved in an acid solution in step 940, as previously discussed herein. Optionally, the acid solution, which includes the manganese and zinc, can be purified, as previously discussed. In certain embodiments, the remaining brine solution from extraction step 930, from which the manganese and zinc have been removed, can then be reinjected into the geothermal well from which the brine was originally removed.

[0082] The acid solution is contacted with an ion exchange resin in step 950, preferably a basic anionic exchange resin, to remove zinc from the solution. In step 960, manganese can be recovered from the solution by electrolytically depositing manganese dioxide from the substantially silica free brine, such as by electrowinning or a like process. In step 970, zinc can then be recovered from the ion exchange resin by known means, and can be converted electrochemically in step 980 to zinc, and the zinc can then be converted to zinc oxide by known means. Optionally, as shown by the dashed line, following removal of the manganese in step 960, the remaining solution can be recycled to dissolution step 940. Similarly, as shown by the dashed line, following zinc recovery step 970, the remaining brine solution can be recycled to ion exchange resin contacting step 950.

[0083] In certain embodiments, an aqueous chloride solution is employed to wash zinc from the ion exchange resin, preferably having a chloride concentration of between about 0.5 and 5%. Optionally, multiple ion exchange resins can be employed. Optionally, at least a portion of a zinc solution produced by washing the ion exchange resin can be recycled to a prior stage of the process. In certain embodiments, the zinc solution produced by washing the ion exchange resin can be extracted with a solvent, wherein the solvent advantageously extracts zinc from the solution. Exemplary extraction solvents have been previously discussed, and can include D2EHPA or the like. Following removal of zinc from the ion exchange resin, a zinc-rich solution is obtained and zinc can then be recovered electrochemically from the zinc-rich solution.

[0084] Referring now to Figure 10, in another aspect, a tenth process for the recovery of manganese and/or zinc from a geothermal brine is provided. First step 1010 of the process includes the removal of iron and silica from the brine solution, as previously described herein. In certain embodiments, the iron is oxidized and base is added to control the pH of the solution to between about 4.5 and 6, preferably between about 4.75 and 5.5. In certain embodiments, iron is oxidized with air and the base is calcium oxide or calcium hydroxide.

[0085] Following the removal of the iron and silica, in precipitation step 1020, additional base is added to cause the precipitation of manganese and zinc. The manganese and zinc precipitates are collected by known means and, in step 1030, dissolved in an acid solution, as previously discussed herein. Optionally, the acid solution that includes the manganese and zinc can be purified. In certain embodiments, the remaining brine solution from extraction step 1020, from which the manganese and zinc have been removed, can then be reinjected into the geothermal well from which the brine was originally removed.

[0086] The acid solution is filtered in step 1040 to produce a manganese containing solution and zinc precipitates. Zinc precipitates are electrochemically converted to zinc metal in step 1050. The solution is passed to zinc solvent extraction step 1060 to recovery remaining zinc. The manganese containing solution from the filtration step is provided to a reduction step 1070 wherein the manganese containing solution is contacted with a reducing agent, such as SO_2 . In step 1080, the reduced manganese can be recovered from the solution by electrolytically depositing manganese dioxide, such as by electrowinning.

[0087] Optionally, as shown by the dashed line, following recovery of zinc in electrochemical recovery step 1060, a sulfuric acid-rich solution can be recycled to zinc extraction step 1050. Similarly, as shown by the dashed line, following the electrochemical recovery of manganese in step 1080, the remaining brine solution can be recycled to either precipitation step 1020 or dissolution step 1030.

[0088] Referring now to Figure 11, in another aspect, a tenth process for the recovery of manganese and/or zinc from a geothermal brine is provided. First step 1110 of the process includes the removal of iron and silica from the brine solution, as previously described herein. In certain embodiments, the iron is oxidized and base is added to control the pH of the solution to between about 4.5 and 6, preferably between about 4.75 and 5.5. In certain embodiments, iron is oxidized with air and the base is calcium oxide or calcium hydroxide.

[0089] Following the removal of the iron and silica, in precipitation step 1120, additional base is added to cause the precipitation of manganese and zinc. The manganese and zinc precipitates are collected by known means and, in step 1130, dissolved in an ammonium sulfate solution. Optionally, the ammonium sulfate solution that includes the manganese and zinc can be purified. In certain embodiments, the remaining brine solution from extraction step 1020, from which the manganese and zinc have been removed, can then be reinjected into the geothermal well from which the brine was originally removed.

[0090] The ammonium sulfate solution is filtered in step 1040 to produce a manganese containing solution and zinc precipitates. Zinc precipitates are electrochemically converted to zinc metal in step 1050. The solution is passed to zinc solvent extraction step 1060 to recovery remaining zinc. The manganese containing solution from the filtration step is provided to a reduction step 1070 wherein the manganese containing solution is contacted with a reducing agent, such as SO_2 . In step 1080, the reduced manganese can be recovered from the solution by electrolytically depositing manganese dioxide, such as by electrowinning.

[0091] Optionally, as shown by the dashed line, following recovery of zinc in electrochemical recovery step 1060, a sulfuric acid-rich solution can be recycled to zinc extraction step 1050. Similarly, as shown by the dashed line, following the electrochemical recovery of manganese in step 1080, the remaining brine solution can be recycled to either precipitation step 1020 or dissolution step 1030.

[0092] In certain embodiments of the present invention, as described herein, solid zinc oxide produced electrochemically or by ion exchange extraction can be dissolved in various acids for the production of zinc compounds. For example, in one embodiment, zinc oxide can be added to hydrochloric acid to form solid zinc chloride. The solid zinc chloride can then be separated by filtration. In certain embodiments, the zinc chloride can be isolated from solution by removing the liquid by evaporation, spray drying, or other known methods. In an alternate embodiment, zinc oxide can be added to hydrobromic acid to form zinc bromide. Alternatively, zinc oxide can be added to sulfuric acid to form zinc sulfate. Alternatively, zinc oxide can be added to methanesulfonic acid to form zinc methanesulfonate. In certain embodiments, to facilitate precipitation of the various zinc compounds, a portion of the solution can be evaporated, or the zinc compound can be separated by spray drying. In

certain embodiments, recovered solid zinc compounds can be washed with minimal water and dried.

[0093] Examples

[0094] For testing purposes, a synthetic brine was employed for examples 1-3 having metal concentrations of approximately the following: 1600 mg/L Fe; 96 mg/L Si; 2500 mg/L Mn; 790 mg/L Zn; 290 mg/L Li; 41,000 mg/L Ca; 27,000 mg/L K; 85,500 mg/L Na; and 185 mg/L Sr.

[0095] Example 1. Approximately 1.22 L of the synthetic brine was placed in a 2L reactor and maintained at a temperature of between about 90-95°C and sparged with air at a rate of about 2.25 L/minute. The initial pH of the brine was about 4.89. To the reaction approximately 14 g of a 20% slurry of calcium hydroxide added. After addition of the slurry, a pH of about 2.85 was achieved, which gradually increased to approximately 3.56 after about 10 minutes. After 40 minutes, at which time the pH was about 2.9, approximately 5.33 g of a 20% slurry of calcium hydroxide was added, which raised the pH to about 4.07. The brine and the calcium hydroxide slurry were mixed for approximately 30 min, during which time the pH decreased to approximately 4.0, at which time approximately 21.22 g of the 20% slurry of calcium hydroxide was added. The addition of the calcium hydroxide slurry increased the pH to approximately 4.5. The mixture was stirred for about another 20 minutes, after which approximately 28.54 g of the calcium hydroxide slurry was again added, and the pH increased to approximately 5.18. The reaction was allowed to stir for an about additional 30 minutes, and the solid was collected and weighed. The solid includes approximately 99.6% of the iron present in the brine and approximately 99.9% of the silica. Additionally, approximately 49.2% of the manganese present in the brine was removed.

[0096] Example 2. Approximately 1.32 L of the synthetic brine was placed in a 2L reactor and maintained at a temperature of between about 90-95°C and sparged with air at a rate of about 2.25 L/minute. The reaction was stirred for approximately 60 minutes and the pH of the solution was monitored. After about 60 minutes, a pH of about 2.05 was achieved. To the brine solution was added approximately 9.73 g of a 20% slurry of calcium hydroxide, which raised the pH to about 5.4. The brine and the calcium hydroxide slurry were mixed for approximately 30 min, during which time the pH decreased to approximately 3.4, at which time approximately 2.56 g of the 20% slurry of calcium hydroxide was added. The addition of the slurry increased the pH to approximately 4.9. The mixture was stirred for about

another 20 minutes, after which approximately 1.21 g of the calcium hydroxide slurry was again added, and the pH increased to approximately 5.3. The reaction was allowed to stir for about an additional 70 minutes, and the solid was collected and weighed. The solid includes approximately 98% of the iron present in the brine and approximately 99% of the silica. Additionally, approximately 2% of the manganese present in the brine was removed.

[0097] Example 3. Approximately 1.32 L of the synthetic brine was placed in a 2L reactor and maintained at a temperature of between about 90-95°C and sparged with air at a rate of about 2.25 L/minute. The reaction was stirred for approximately 60 minutes and the pH of the solution was monitored. After about 22 minutes, a pH of about 2.52 was achieved. To the brine solution was added approximately 9.7 g of a 20% slurry of calcium hydroxide, which raised the pH to about 5.56. The brine and the calcium hydroxide slurry were mixed for approximately 13 min, during which time the pH decreased to approximately 4.27, at which time approximately 1.9 g of the 20% slurry of calcium hydroxide was added. The addition of the calcium hydroxide slurry increased the pH to approximately 5.2. The mixture was stirred for about another 5 minutes, during which time the pH decreased to approximately 4.49. Approximately 2.25 g of the calcium hydroxide slurry was again added, and the pH increased to approximately 5.17. The reaction was allowed to stir for about an additional 110 minutes, during which time the pH was maintained at between about 5.13 and 5.17, and the solid was collected and weighed. The solid includes approximately 95.6% of the iron present in the brine and approximately 88.5% of the silica. Additionally, approximately 2% of the manganese present in the brine was removed.

[0098] Example 4. A synthetic brine having a composition that includes about 330 mg/L Li; 2400 mg/L Mn; 740 mg/L Zn; 40,000 mg/L Ca; 26,000 mg/L K; 91,000 mg/L Na; 180 mg/L Sr and 0.8 mg/L Fe was placed in a 2L reactor and maintained at a temperature of between about 90-95°C and sparged with air at a rate of about 2.25 L/minute. The initial pH was approximately 5.5. After sparging the reactor with air, a calcium hydroxide slurry was added sufficient to bring the pH to approximately 6.6. Additional calcium hydroxide slurry was added over about the next 180 minutes at various intervals. During the addition of the calcium hydroxide slurry, the pH increased from an initial value of about 6.6 to 8. A precipitate was collected which included zinc and manganese. The process recovered about 95.2% of the manganese present in the brine, about 94.6% of the zinc present in the brine, about 0.8% of the calcium present in the brine, and about 75% of the iron present in the brine. Due to the high recovery of iron by this process, the need for removal is confirmed.

[0099] Example 5. A synthetic brine having a composition that includes about 326 mg/L Li; 2640 mg/L Mn; 886 mg/L Zn; 41,000 mg/L Ca; 28,000 mg/L K; 84,000 mg/L Na; 180 mg/L Sr and 0.3 mg/L Fe was placed in a 2L reactor and maintained at a temperature of between about 90-95°C and sparged with air at a rate of about 2.25 L/minute. After sparging the reactor with air, a calcium hydroxide slurry was added in a single dosage sufficient that the pH of the brine solution was measured immediately after addition of the calcium hydroxide slurry and was about 7.6. During the stirring and sparging of the reaction, the pH increased from an initial value of about 7.6 to 7.9 after approximately 15 minutes, and then decreased gradually to about 7.5. A precipitate was collected which included zinc and manganese. The process recovered about 100% of the manganese present in the brine, about 99.9% of the zinc present in the brine, and about 8% of the lithium present in the brine.

[00100] As is understood in the art, not all equipment or apparatuses are shown in the figures. For example, one of skill in the art would recognize that various holding tanks and/or pumps may be employed in the present method.

[00101] The singular forms "a", "an" and "the" include plural referents, unless the context clearly dictates otherwise.

[00102] Optional or optionally means that the subsequently described event or circumstances may or may not occur. The description includes instances where the event or circumstance occurs and instances where it does not occur.

[00103] Ranges may be expressed herein as from about one particular value, and/or to about another particular value. When such a range is expressed, it is to be understood that another embodiment is from the one particular value and/or to the other particular value, along with all combinations within said range.

[00104] Throughout this application, where patents or publications are referenced, the disclosures of these references in their entireties are intended to be incorporated by reference into this application, in order to more fully describe the state of the art to which the invention pertains, except when these reference contradict the statements made herein.

[00105] As used herein, recitation of the term about and approximately with respect to a range of values should be interpreted to include both the upper and lower end of the recited range.

[00106] Although the present invention has been described in detail, it should be understood that various changes, substitutions, and alterations can be made hereupon without departing from the principle and scope of the invention. Accordingly, the scope of the present invention should be determined by the following claims and their appropriate legal equivalents.

We claim:

1. A method for recovering zinc and manganese from a geothermal brine, the method comprising the steps of:
 - providing a geothermal brine, said geothermal brine comprising manganese and zinc;
 - selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine;
 - adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed;
 - separating the zinc and manganese precipitates from the brine;
 - dissolving the precipitates of zinc and manganese to produce a zinc and manganese containing solution;
 - extracting the zinc and manganese containing solution with an extraction solvent to produce a first liquid phase that includes the extraction solvent and zinc and a second liquid phase that includes manganese;
 - separating the first and second liquid phases;
 - electrochemically recovering zinc from the first liquid phase;
 - reducing the second liquid phase to form Mn^{2+} ;
 - supplying the Mn^{2+} to an electrochemical cell and recovering the manganese by electrochemical means.
2. The method of claim 1 wherein the precipitates of zinc and manganese are dissolved in an acid.
3. The method of claim 1 wherein the precipitates of zinc and manganese are dissolved in ammonium sulfate.

4. The method of claim 1 wherein the step of selectively removing silica and iron from the geothermal brine comprises providing iron (III) at a pH of between about 4.5 and 6 and precipitating the silica and iron from the brine.

5. The method of claim 1 wherein the step of precipitating the zinc and manganese comprises adding sufficient base to adjust the pH to between 6 and 8 and providing an air oxidant to the substantially silica free brine.

6. The method of claim 1 further comprising contacting the zinc with hydrochloric acid to produce zinc chloride.

7. A method for recovering zinc and manganese from a geothermal brine, the method comprising the steps of:

providing a geothermal brine, said geothermal brine comprising manganese and zinc;

selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine;

adjusting the pH of the substantially silica free brine to a pH suitable to form precipitates of zinc and manganese, such that precipitates of zinc and manganese are selectively formed and other metal precipitates are not formed;

separating the zinc and manganese precipitates from the brine;

dissolving the precipitates of zinc and manganese to produce a zinc manganese solution;

oxidizing the manganese to form a manganese precipitate and a zinc solution;

separating the manganese precipitate from the zinc solution;

recovering the zinc by electrochemical means.

8. The method of claim 7 wherein the step of selectively removing silica and iron from the geothermal brine comprises providing iron (III) at a pH of between about 4.5 and 6 and precipitating the silica and iron from the brine.

9. The method of claim 7 wherein the step of precipitating the zinc and manganese comprises adding sufficient base to adjust the pH to between 6 and 8 and providing an air oxidant to the substantially silica free brine.
10. The method of claim 7 wherein the step of dissolving the zinc and manganese comprises providing a mineral acid sufficient to dissolve the zinc and manganese precipitate.
11. The method of claim 7 wherein the step of recovering the zinc by electrochemical means comprises plating an electrode with zinc metal from the zinc solution.
12. A method for recovering zinc and manganese from a geothermal brine, the method comprising the steps of:
- providing a geothermal brine, said geothermal brine comprising manganese and zinc;
 - selectively removing silica and iron from the geothermal brine to produce a substantially silica free brine that includes manganese and zinc;
 - removing the zinc from the substantially silica free brine;
 - extracting manganese from the substantially silica free brine;
 - oxidizing the manganese to produce a manganese dioxide precipitate; and
 - recovering the magnesium dioxide precipitate.
13. The method of claim 12 wherein the step of selectively removing silica and iron from the geothermal brine comprises providing iron (III) at a pH of between about 4.5 and 6 and precipitating the silica .
14. The method of claim 12 wherein the zinc is removed from the substantially silica free brine by ion exchange.
15. The method of claim 12 wherein the step of oxidizing the manganese to produce manganese dioxide comprises electrolytic deposition.
16. A method for recovering zinc and manganese from a geothermal brine, the method comprising the steps of:

providing a geothermal brine, said geothermal brine comprising manganese and zinc;
selectively removing silica and iron from the geothermal brine to produce a
substantially silica free brine that comprises manganese and zinc;
extracting manganese and zinc from the substantially silica free brine to produce a
manganese zinc solution;
electrochemically removing manganese from the manganese zinc solution to produce
a residual solution that includes zinc; and
electrochemically removing zinc from the residual solution.

17. The method of claim 16 wherein the step of selectively removing silica and iron from the geothermal brine comprises providing iron (III) at a pH of between about 4.5 and 6 and precipitating the silica .

18. The method of claim 16 wherein the step extracting manganese and zinc from the substantially silica free brine comprises extracting the manganese and zinc with a solvent selected from the group consisting of phosphines, phosphoric acids, and phosphinic acids.

19. The method of claim 16 wherein the step of recovering the manganese by electrochemical means comprises plating an electrode with manganese metal from the manganese zinc solution.

20. The method of claim 16 wherein the step of electrochemically removing the zinc means comprises plating an electrode with zinc metal from the zinc solution.

SELECTIVE RECOVERY OF MANGANESE AND ZINC FROM GEOTHERMAL BRINES

ABSTRACT

This invention relates to a method for the selective recovery of manganese and zinc from geothermal brines that includes the steps of removing silica and iron from the brine, oxidizing the manganese and zinc to form precipitates thereof, recovering the manganese and zinc precipitates, solubilizing the manganese and zinc precipitates, purifying the manganese and zinc, and forming a manganese precipitate, and recovering the zinc by electrochemical means.

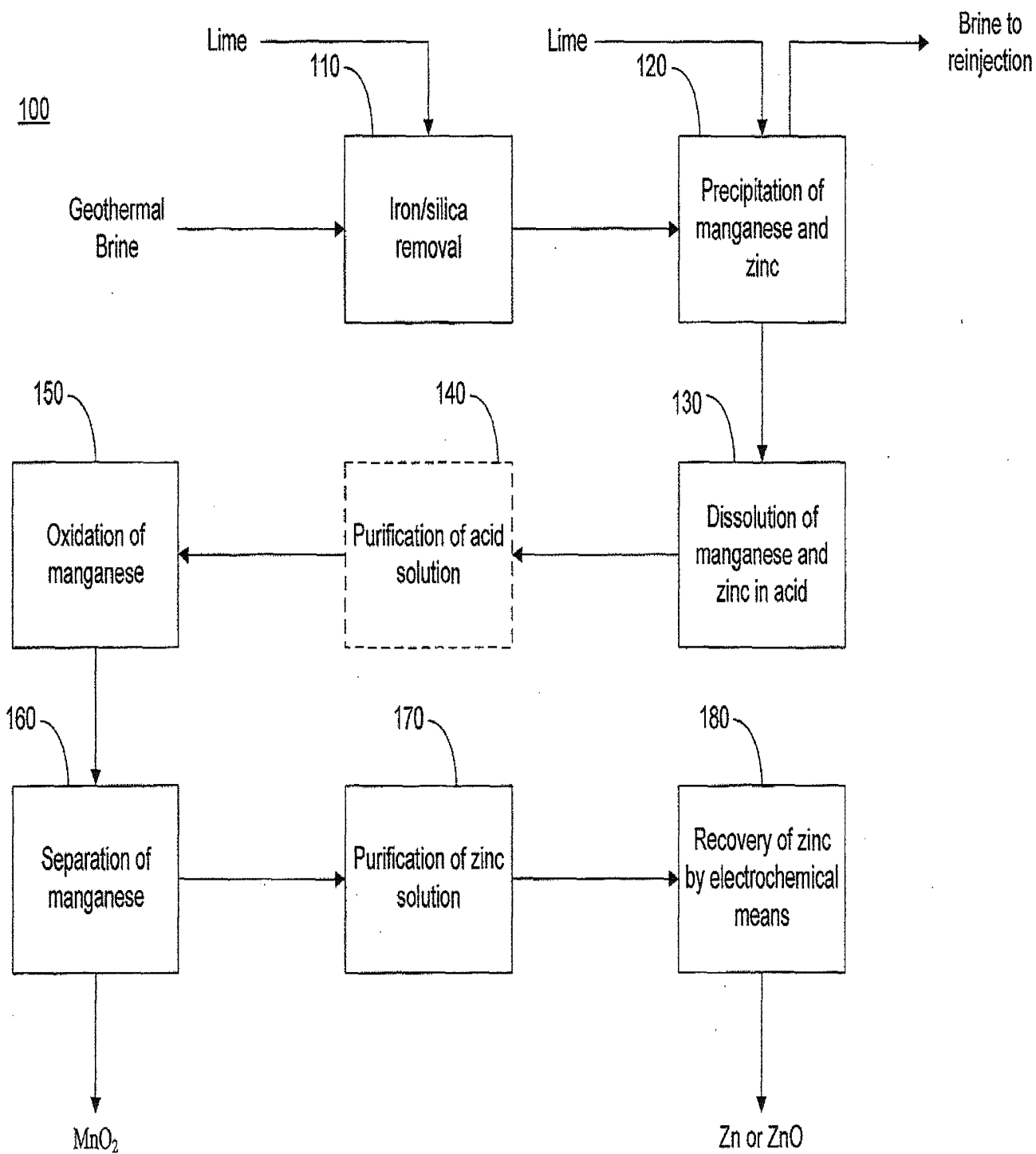


Figure 1

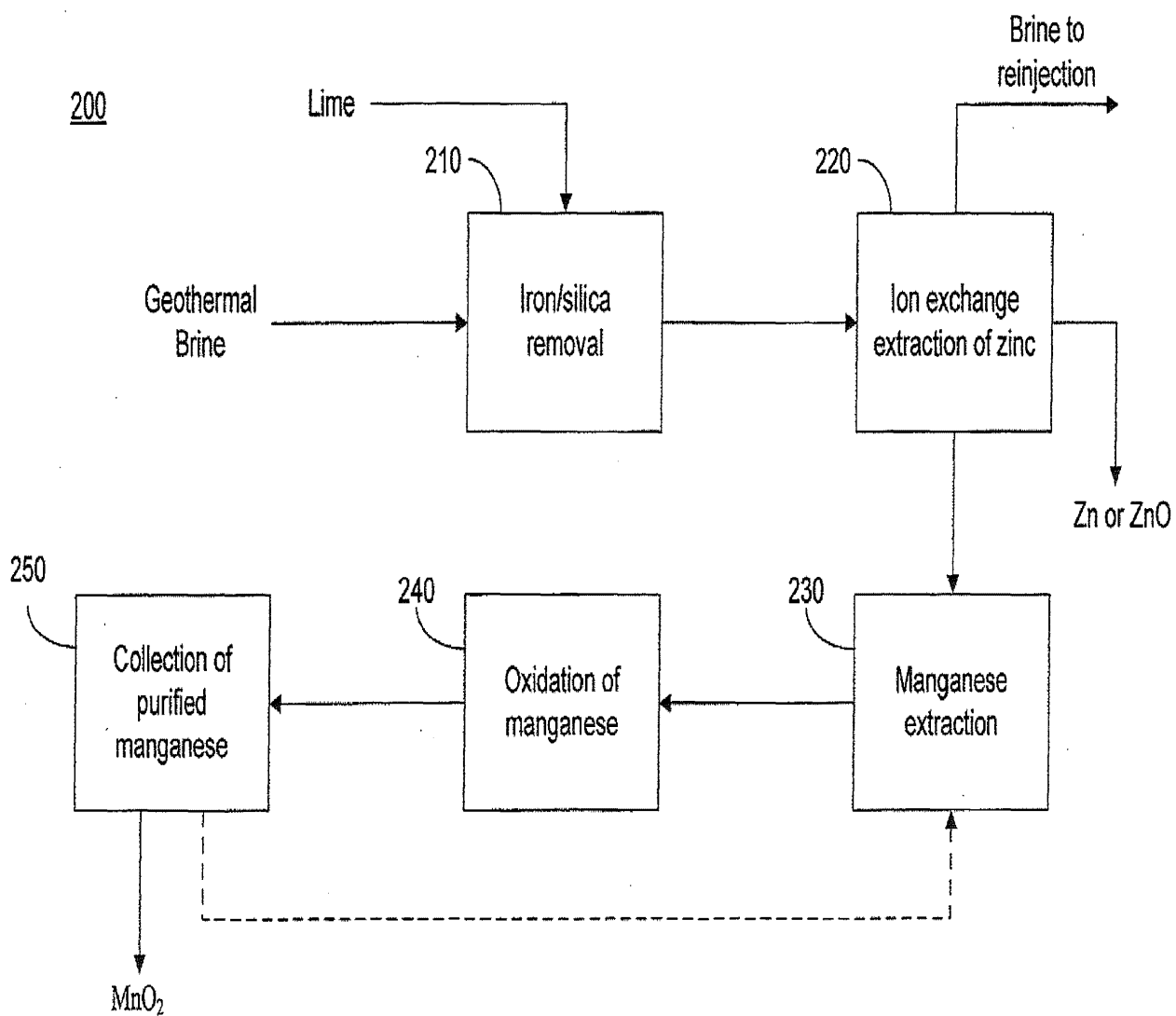


Figure 2

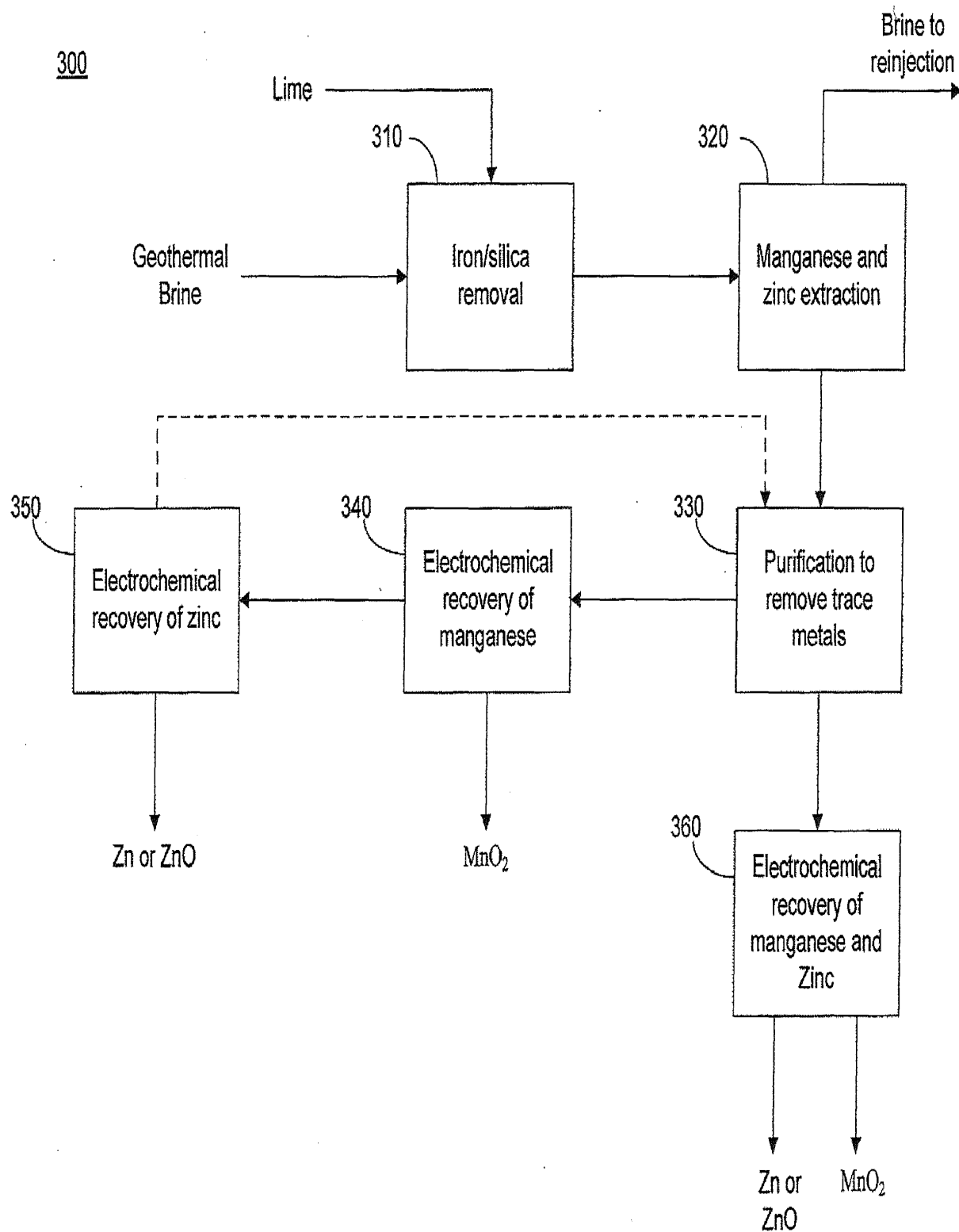


Figure 3

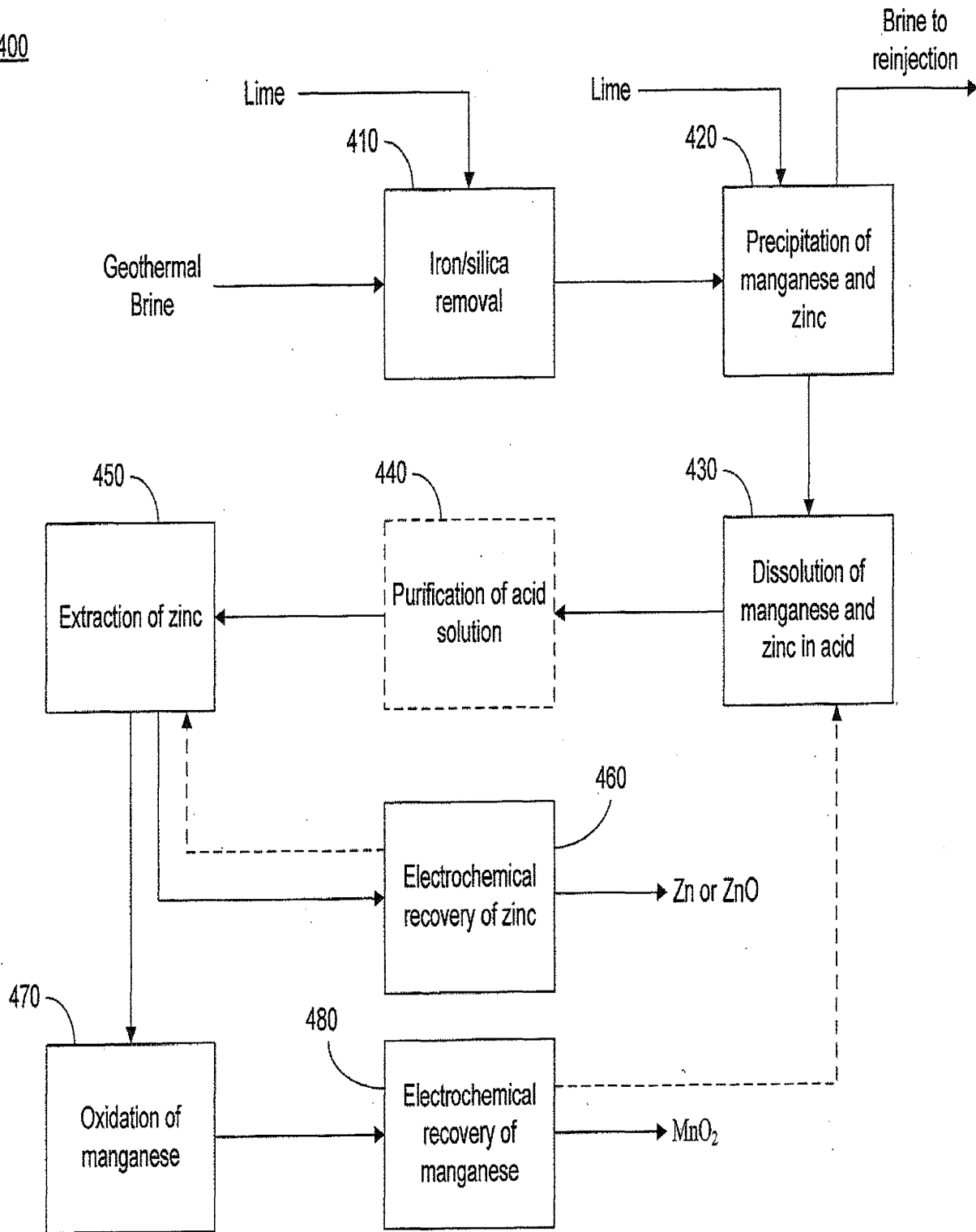


Figure 4

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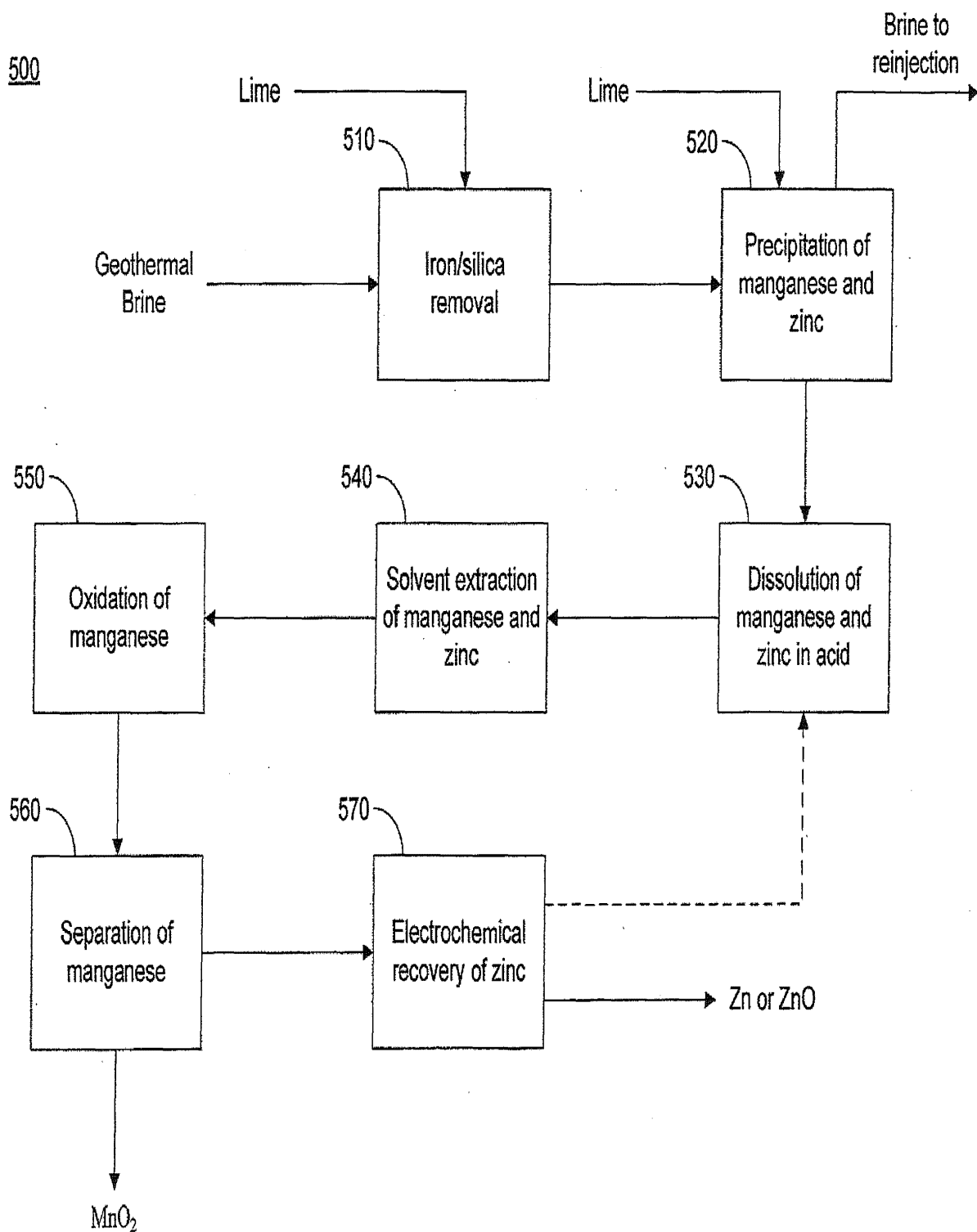


Figure 5

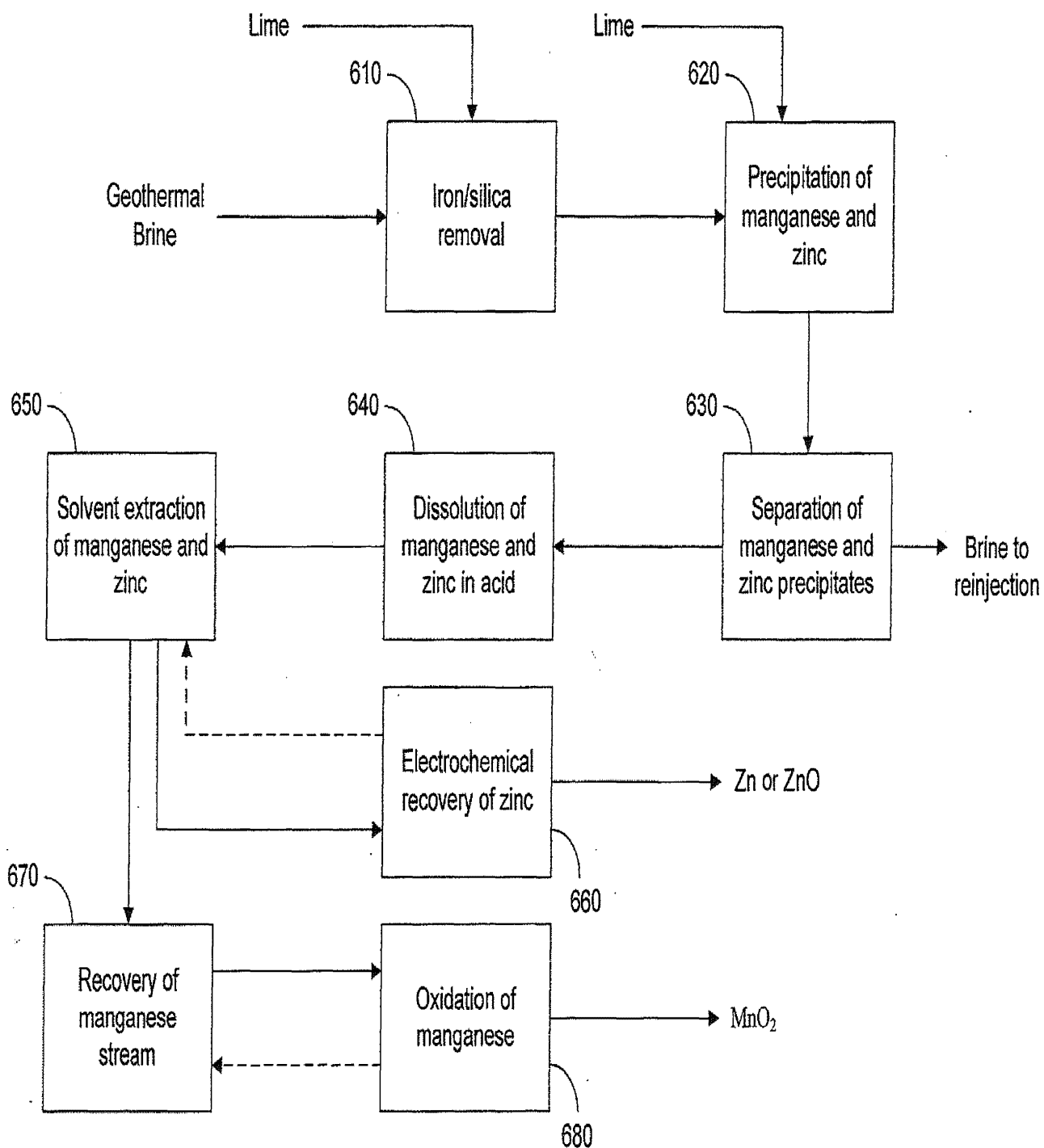


Figure 6

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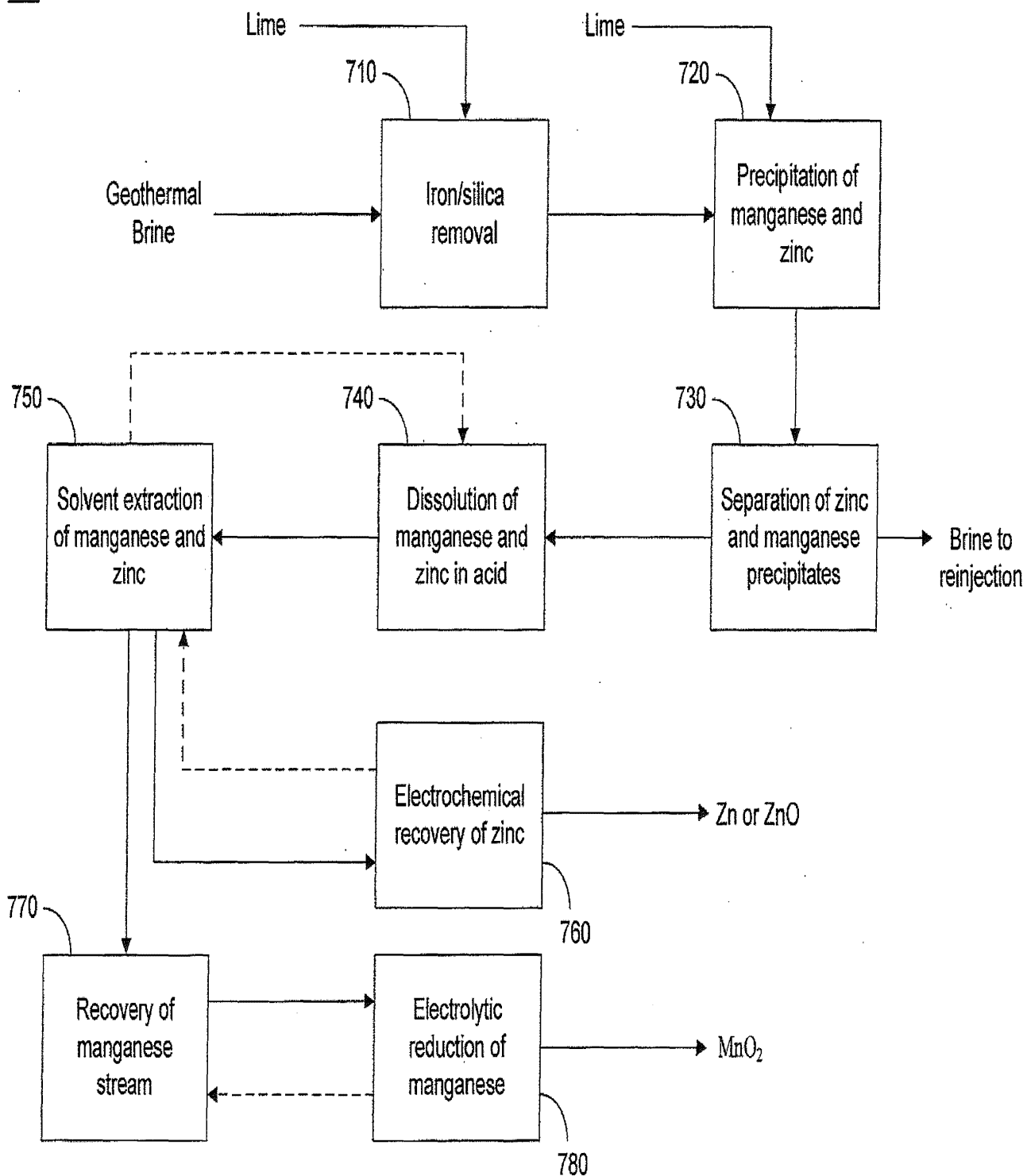


Figure 7

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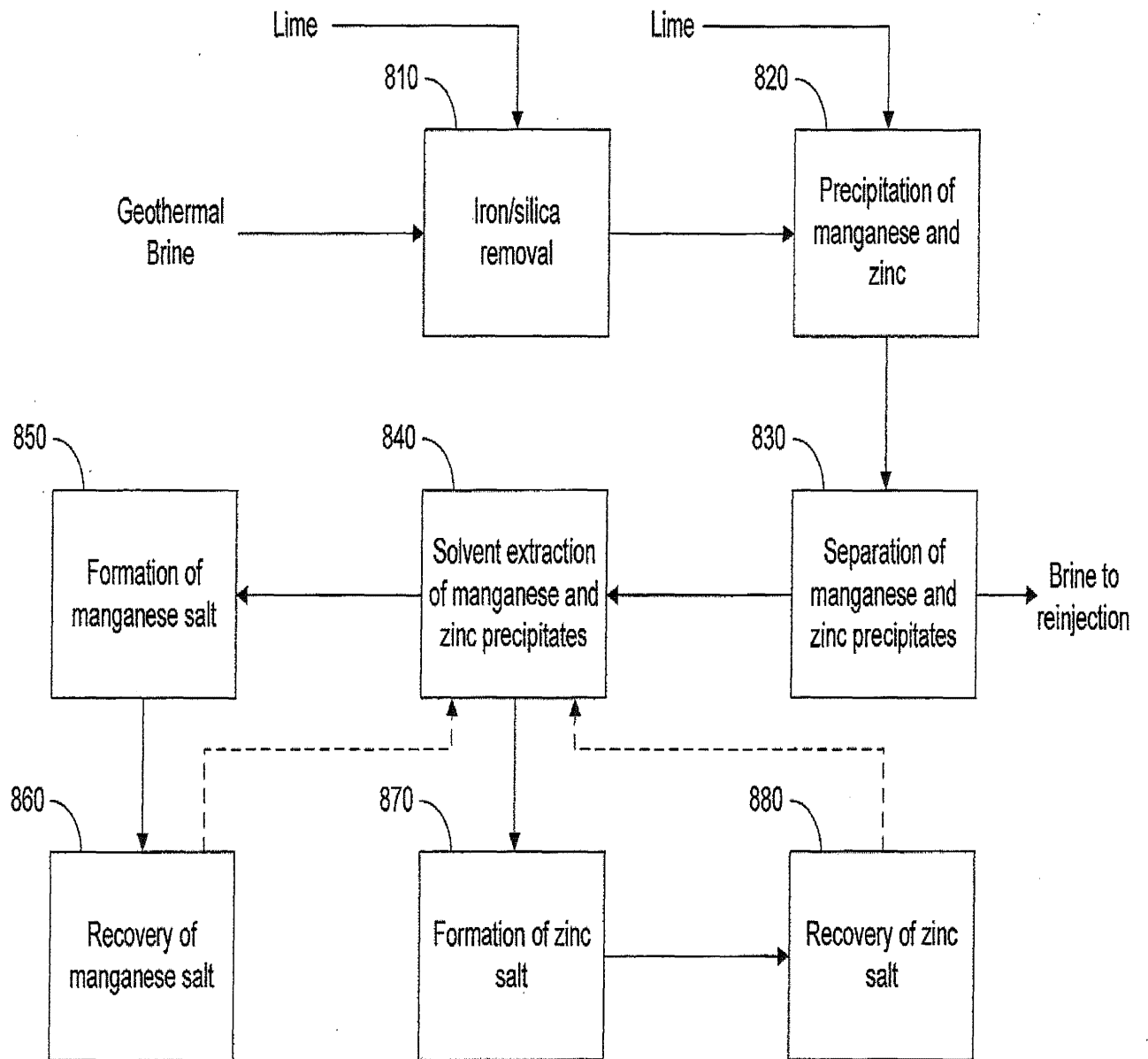


Figure 8

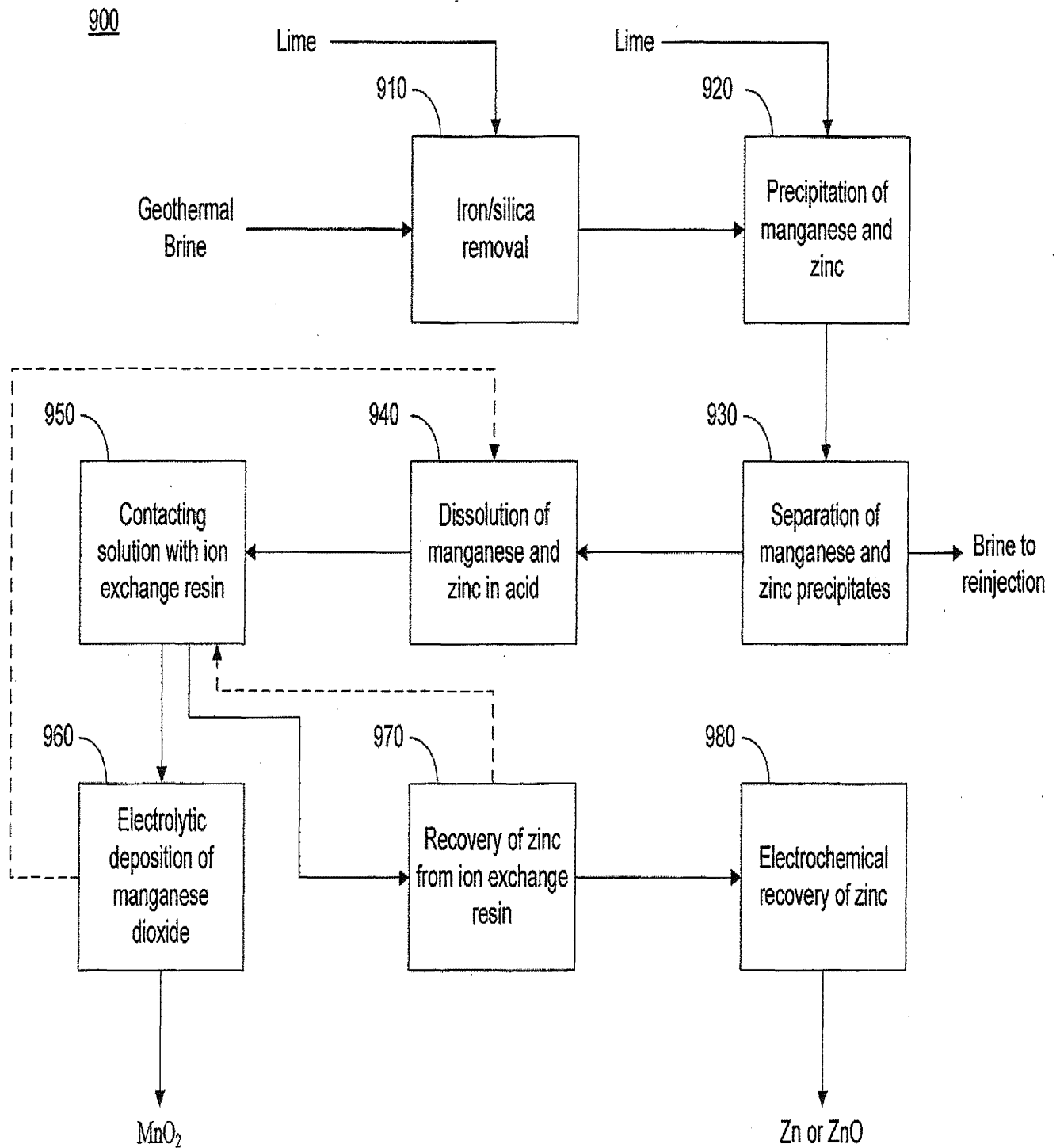


Figure 9

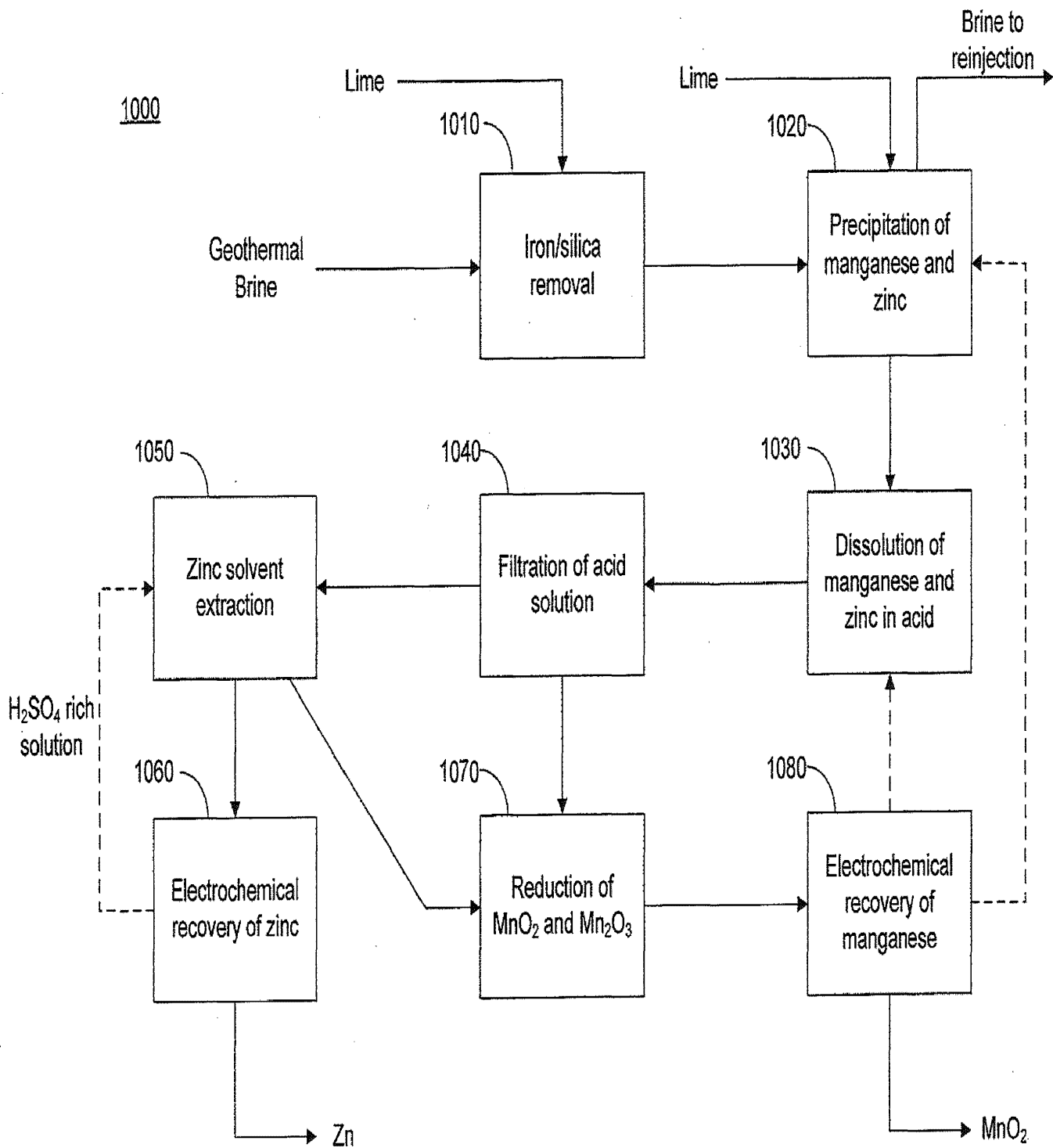


Figure 10

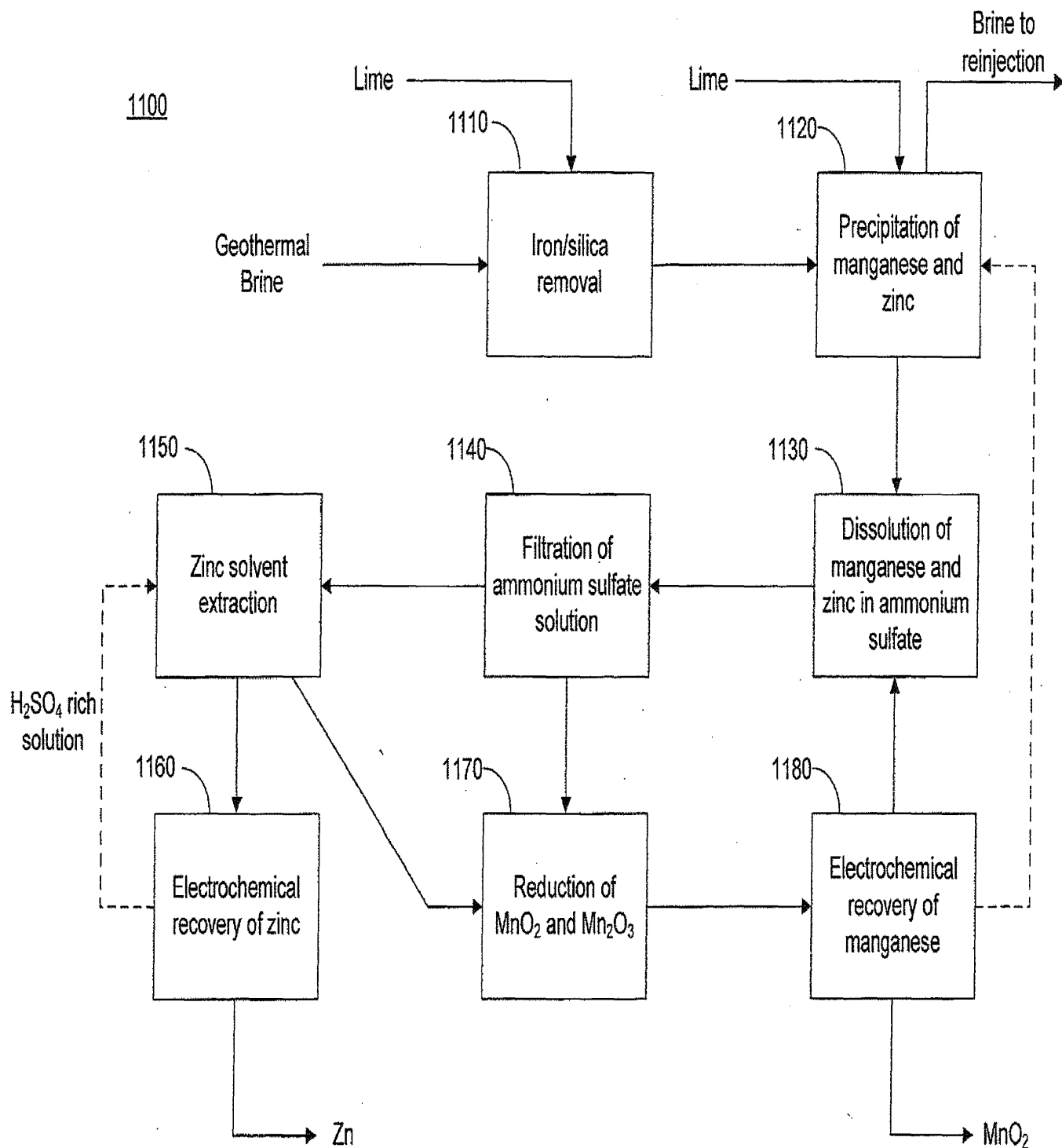


Figure 11

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/874,004	Filing Date 04/30/2013	<input type="checkbox"/> To be Mailed
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ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

(Column 1)

(Column 2)

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

(Column 1)

(Column 2)

(Column 3)

AMENDMENT	04/30/2013	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 41	Minus	** 20	= 21	x \$40 =	840
	Independent (37 CFR 1.16(h))	* 35	Minus	*** 3	= 32	x \$210 =	6720
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))						
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
TOTAL ADD'L FEE							7560

(Column 1)

(Column 2)

(Column 3)

AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
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	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
TOTAL ADD'L FEE						

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LDRC
/CHRIS A. JONES/

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