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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/407,556	03/19/2009	Roy G. Gordon	42697.135-US7	7572
23483	7590	01/12/2012		
WILMERHALE/BOSTON 60 STATE STREET BOSTON, MA 02109			EXAMINER CHEN, BRET P	
			ART UNIT 1715	PAPER NUMBER
			NOTIFICATION DATE 01/12/2012	DELIVERY MODE 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):

teresa.carvalho@wilmerhale.com
whipusptopairs@wilmerhale.com

Office Action Summary	Application No. 12/407,556	Applicant(s) GORDON ET AL.	
	Examiner BRET CHEN	Art Unit 1715	

-- 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 1 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

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Status

- 1) ☐ Responsive to communication(s) 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) 1-20 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- 5a) Of the above claim(s) ____ is/are withdrawn from consideration.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) ____ is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☒ Claim(s) 1-20 are subject to restriction and/or election requirement.

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).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
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) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claims 1-20 are pending in this application, which is a CON of Serial Number 11/199032 now US Patent 7,507,848; which is a CON of Serial Number 10/381628 now US Patent 6,969,539; which is a 371 of PCT/US01/30507.

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-10, drawn to a method, classified in class 427, subclass 255.31.
- II. Claims 11-20, drawn to a product, classified in class 428, subclass 701.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the product as claimed can be made by another and materially different process such as sputtering.

Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and/or examination burden if restriction were not required because at least the following reason(s) apply:

The search and prosecution of method and product claims present a serious burden.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

A telephone call was made to Mary Rose Scozzafava on January 3, 2012, to request an oral election to the above restriction requirement, but did not result in an election being made.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Art Unit: 1715

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Bret Chen/

Primary Examiner, Art Unit 1715

1/6/12

<p align="center"><i>Index of Claims</i></p> 	Application/Control No. 12407556	Applicant(s)/Patent Under Reexamination GORDON ET AL.
	Examiner BRET CHEN	Art Unit 1715

✓	Rejected
=	Allowed

-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

☐ Claims renumbered in the same order as presented by applicant
 ☐ CPA
 ☐ T.D.
 ☐ R.1.47

CLAIM		DATE								
Final	Original	01/06/2012								
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Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2012.
- 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.
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- 6) ☐ Claim(s) ____ is/are allowed.
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- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 19 March 2009 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).
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DETAILED ACTION

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The preliminary amendment dated 3/9/12 canceling claims 11-20 has been entered. In view of said amendment, the restriction requirement has been withdrawn.

Specification

The disclosure is objected to because of the following informalities listed below. Appropriate correction is required.

In the first paragraph of the specification, the lineage of the parent applications should be updated to reflect maturation into a US Patent.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aarik et al. (Thin Solid Films article) in view of Vaartstra (6,159,855).

Aarik discloses an ALD method of growing hafnium dioxide from HfCl_4 and H_2O (abstract) in which the reactants are introduced into a hot wall ALD reactor in alternating pulses (p.111 col.1 and Figure 1). However, the reference fails to teach a metal alkylamide.

Vaartstra discloses organometallic compound mixtures for use in chemical vapor deposition (title) in which metalloamide compounds are used (col.2 line 48- col.3 line 6). In one embodiment, the metalloamide compounds can be a variety of compounds including tetrakis-(diethylamido)-hafnium and tetrakis-(diethylamido)-zirconium (col.6 lines 19-56). It would have been obvious to incorporate same in the process of Aarik with the expectation of obtaining similar results because Vaartstra teaches the conventionality of using metalloamide compounds as precursors in a vapor deposition process.

Regarding claim 2, Aarik teaches of using hafnium dioxide as an insulator in electronic devices (p.110 col.1).

Regarding claim 3, Aarik teaches the use of tetrakis-(diethylamido)-hafnium (col.6 lines 19-56).

Regarding claims 4-5, Aarik teaches the use of tetrakis-(diethylamido)-hafnium, tetrakis-(diethylamido)-zirconium, and tetrakis-(dimethylamido)-zirconium (col.6 lines 19-56). Given

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such a teaching, one skilled in the art would reasonably expect that tetrakis-(ethylmethyamido) - hafnium could be utilized to form a hafnium dioxide film with the expectation of success in the absence of a showing of unexpected results. The same issue applies to tetrakis-(dimethylamido)- hafnium.

Regarding claim 6, Aarik teaches the use of tetrakis-(diethylamido)-hafnium (col.6 lines 19-56)

Regarding claim 7, Aarik teaches the use of tetrakis-(diethylamido)-zirconium and tetrakis-(dimethylamido)-zirconium (col.6 lines 19-56).

Regarding claim 8, Aarik teaches the use of tetrakis-(diethylamide)-hafnium, tetrakis-(diethylamido)-zirconium, and tetrakis-(dimethylamido)-zirconium (col.6 lines 19-56). Given such a teaching, one skilled in the art would reasonably expect that tetrakis-(ethylmethyamido) - zirconium could be utilized to form a zirconium oxide film with the expectation of success in the absence of a showing of unexpected results.

Regarding claim 9, Aarik teaches the use of tetrakis-(dimethylamido)-zirconium (col.6 lines 19-56).

Regarding claim 10, Aarik teaches the use of tetrakis-(diethylamido)-zirconium (col.6 lines 19-56).

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 obviousness-type double patenting rejection is appropriate where the conflicting claims 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 conflicting 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.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-10 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 24-31 of U.S. Patent No. 6,969,539 in view of Vaartstra (6,159,855).

Gordon et al. (6,969,539) teaches a process for forming a metal oxide, comprising: exposing a heated surface alternately to the vapor of one or more metal amides having an amido group selected from the group consisting of dialkylamido, disilylamido and (alkyl)(silyl) amido moieties, and then to the vapors of water or an alcohol (claim 24), which is similar to the instant claim 1. However, the reference fails to specifically teach a metal alkylamide.

Vaartstra discloses organometallic compound mixtures for use in chemical vapor deposition (title) in which metalloamide compounds are used (col.2 line 48- col.3 line 6). In one embodiment, the metalloamide compounds can be a variety of compounds including tetrakis-

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(diethylamido)-hafnium and tetrakis-(diethylamido)-zirconium (col.6 lines 19-56). It would have been obvious to incorporate same in the process of Gordon with the expectation of obtaining similar results because Vaartstra teaches the conventionality of using metalloamide compounds as precursors in a vapor deposition process.

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/Bret Chen/

Primary Examiner, Art Unit 1715

3/15/12

LISTING OF CLAIMS

1. (Currently Amended): A process for making an insulator in a microelectronic device, the process comprising:
 - introducing a first reactant component into a deposition chamber;
 - introducing a second reactant component into the deposition chamber; and
 - alternately repeating introducing the first reactant component and the second reactant component into the deposition chamber;

wherein deposition of the first reactant component and the second reactant component are self-limiting;

 - wherein said first reactant component comprises a metal alkylamide;
 - wherein said second reactant component interacts with the deposited first reactant component to form the insulator; and
 - wherein said insulator comprises oxygen and the metal from the metal alkylamide.
2. (Original): The process as in claim 1, wherein the insulator insulates a gate or a capacitor.
3. (Original): The process in claim 2, wherein the metal alkylamide is a hafnium dialkylamide.
4. (Original): The process as in claim 3, wherein the hafnium dialkylamide is tetrakis(ethylmethyamido)hafnium.

5. (Original): The process as in claim 3, wherein the hafnium dialkylamide is tetrakis(dimethylamido)hafnium.
6. (Original): A process as in claim 3, wherein the hafnium dialkylamide is tetrakis(diethylamido)hafnium.
7. (Original): A process as in claim 2, wherein the metal alkylamide is a zirconium dialkylamide.
8. (Original): A process as in claim 7, wherein the zirconium dialkylamide is tetrakis(ethylmethylamido)zirconium.
9. (Original): A process as in claim 7, wherein the zirconium dialkylamide is tetrakis(dimethylamido)zirconium.
10. (Original): A process as in claim 7, wherein the zirconium dialkylamide is tetrakis(diethylamido)zirconium.
- 11-20. (Cancelled).

REMARKS

I. Objections to the Specification

The first paragraph of the specification has been amended to reflect maturation of the parent applications into U.S. Patents as requested by the Examiner. Withdrawal of the objection is requested.

II. Amendments to the Claims

Claim 1 is amended. Support for the amendments can be found throughout the specification. For example, support can be found at page 27, line 23 – page 28, line 12 of the originally filed specification. No new matter is added.

III. Rejections under 35 U.S.C. §103(a) and Double Patent Rejection

Claims 1-10 have been rejected under 35 U.S.C. §103(a) over Aarik et al. (Thin Solid Films article) in view of Vaartstra (U.S. Patent No. 6,159,855). Claims 1-10 have also been rejected under nonstatutory obviousness-type double patenting over claims 24-31 of Gordon (U.S. Patent No. 6,969,539) in view of Vaartstra. Applicants respectfully request reconsideration in light of the amendments to the claims and the comments that follow.

Claim 1, as amended, is directed to, *inter alia*, “introducing a first reactant component into a deposition chamber; introducing a second reactant component into the deposition chamber; and alternately repeating introducing the first reactant component and the second reactant component into the deposition chamber, wherein deposition of the first reactant component and the second reactant component are self-limiting.” (Emphases added.) In other words, claim 1 is directed to an alternating layer deposition (ALD) process.

Claims 24-31 of Gordon is directed to a “process for forming a metal oxide comprising exposing a heated surface alternately to the vapor of one or more metal amides having an amido group selected from the group consisting of dialkylamido, disilylamido and (alkyl)(silyl) amido moieties, and then to the vapors of water or an alcohol.” (Emphasis added.)

Aarik describes an “ALD method of growing hafnium dioxide from HfCl_4 and H_2O (abstract) in which the reactants are introduced into a hot wall ALD reactor in alternating pulses (p. 111 col. 1 and Figure 1).” (Office Action, page 3; emphases added.) However, as the Office Action recognizes, Aarik “fails to teach a metal alkylamide.” (*Id.*)

To remedy the deficiencies of Aarik and Gordon, the Office Action asserts that because “Vaartstra discloses organometallic compound mixtures for use in chemical vapor deposition (title) in which metalloamide compounds are used” (Office Action, page 3), Vaartstra can be combined with Aarik. The Office Action further asserts that Vaartstra and Gordon are also combinable for the same reason. Applicants respectfully disagree.

Both CVD and ALD require a volatile source of precursor. However, both CVD and ALD entail using precursor compounds that have particular types of chemical reactivity particularly suited for each of the deposition techniques. For example, ALD specifically requires precursors that can provide self-limiting growth during deposition, which is not needed in CVD techniques. In fact, for CVD to occur, Applicants submit that one of ordinary skill would want a continuous growth during deposition, not a self-limited growth during deposition. In contrast, for ALD, a self-limited growth is desired. Accordingly, many compounds that have been utilized for CVD process are not necessarily capable of being utilized in an ALD process, as it cannot be predicted whether certain precursors will be able to achieve the self-limited growth that is needed for ALD.

As support, Applicants submit herewith a review article by Jones, A.C., et al., “MOCVD and ALD of High-K Dielectric Oxides Using Alkoxide Precursors,” Chemical Vapor Deposition, volume 12, pages 83-98 (2006). The conclusion of this paper, on page 96, shows that a large class

of compounds developed to be particularly effective as CVD precursors, failed to achieve the self-limited growth that is needed for ALD precursors. Hence, even as late as 2006, one of ordinary skill in the art could not predict a priori whether certain precursors useful for CVD can or cannot be utilized in ALD. Nevertheless, Applicants have determined that the particular claimed metal alkylamides do indeed provide the self-limiting growth characteristics needed for a successful ALD process. There is no teaching or suggestion in Vaartstra that any of the precursors described therein can provide a self-limited growth during deposition.

Many other reviews of CVD can be cited, none of which even mentions self-limited reactivity, a property that is important to the performance of ALD. (*See, e.g.*, L. McElwee-White, "Design of precursors for the CVD of inorganic thin films," Dalton Transactions, pages 5327-5333 (2006); G. G. Condorelli et al., "Engineering of molecular architectures of β -diketonate precursors toward new advanced materials," Coordination Chemistry Reviews, volume 251, pages 1931-1950 (2007); K. L. Choy, "Chemical vapour deposition of coatings," Progress in Materials Science, volume 48, pages 57-170 (2003); "Chemical Vapor Deposition," Kirk-Othmer Encyclopedia of Chemical Technology (John Wiley & Sons), volume 5, pages 803-813.) Thus, the mere mention of a precursor as useful in CVD does not necessarily inform one of ordinary skill in the art whether it can be utilized in an ALD process as well.

Moreover, the Office Action fails to provide specific technical reasons why one of ordinary skill in the art, at the time the instant original application was filed, would have expected the precursors that were useful in CVD, as described in Vaartstra, would also equally be useful in an ALD process.

Accordingly, withdrawal of the rejections is respectfully requested.



UNITED STATES PATENT AND TRADEMARK OFFICE

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NOTICE OF ALLOWANCE AND FEE(S) DUE

23483 7590 10/10/2012
WILMERHALE/BOSTON
60 STATE STREET
BOSTON, MA 02109

EXAMINER

CHEN, BRET P

ART UNIT

PAPER NUMBER

1715

DATE MAILED: 10/10/2012

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/407,556	03/19/2009	Roy G. Gordon	42697.135-US7	7572

TITLE OF INVENTION: VAPOR DEPOSITION OF METAL OXIDES, SILICATES AND PHOSPHATES, AND SILICON DIOXIDE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$885	\$300	\$0	\$1185	01/10/2013

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 SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

- A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.
- B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

- A. Pay TOTAL FEE(S) DUE shown above, or
- B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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.

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.
12/407,556	03/19/2009	Roy G. Gordon	42697.135-US7	7572

TITLE OF INVENTION: VAPOR DEPOSITION OF METAL OXIDES, SILICATES AND PHOSPHATES, AND SILICON DIOXIDE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$885	\$300	\$0	\$1185	01/10/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
CHEN, BRET P	1715	427-255310

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, 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 credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

This collection of information 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.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/407,556	03/19/2009	Roy G. Gordon	42697.135-US7	7572
23483 7590 10/10/2012 WILMERHALE/BOSTON 60 STATE STREET BOSTON, MA 02109			EXAMINER CHEN, BRET P	
			ART UNIT	PAPER NUMBER
			1715	

DATE MAILED: 10/10/2012

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

The Patent Term Adjustment to date is 521 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 521 day(s).

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 Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

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.	Applicant(s)	
	12/407,556	GORDON ET AL.	
	Examiner	Art Unit	
	BRET CHEN	1715	

-- 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 9/6/12.
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 1-10.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - 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. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date ____.
 - (b) ☐ 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).

7. ☐ 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)

<ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date <u>9/6/12, 3/15/12</u> 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material 	<ol style="list-style-type: none"> 5. <input type="checkbox"/> Notice of Informal Patent Application 6. <input type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date ____. 7. <input type="checkbox"/> Examiner's Amendment/Comment 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance 9. <input type="checkbox"/> Other ____.
---	--

/Bret Chen/ Primary Examiner, Art Unit 1715	
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Art Unit: 1715

REASONS FOR ALLOWANCE

The following is an examiner's statement of reasons for allowance:

It is well known to form a metal oxide by ALD as noted by Aarik et al. (Thin Solid Films article). With respect to the precursor, it is well known to utilize metal alkylamide to form an oxide film by CVD as noted in Vaarstra (6,159,855). Furthermore, it is well known to utilize metal alkylamide to form a titanium-silicon-nitride film by ALD (Applied Physics Letters article). However, the prior art references fail to teach or suggest using alkylamide to form a metal oxide film by ALD.

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 BRET CHEN whose telephone number is (571)272-1417. The examiner can normally be reached on 7:30am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. 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.

/Bret Chen/

Primary Examiner, Art Unit 1715

9/26/12

Notice of References Cited	Application/Control No. 12/407,556		Applicant(s)/Patent Under Reexamination GORDON ET AL.	
	Examiner BRET CHEN		Art Unit 1715	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2006/0258078	11-2006	Lee et al.	438/216
	B	US-			
	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	Min, Jae-Sik, et al., "Metal-organic atomic-layer deposition of titanium-silicon-nitride films". Applied Physics Letters, Volume 75, Number 11, 13 September 1999, pp.1521-1523.
	V	Hausmann, Dennis M., et al., "Atomic Layer Deposition of Hafnium and Zirconium Oxides Using Metal Amide Precursors". Chem. Mater. Vol.14, No.10, 2002, 4350-4358.
	W	Leskela, Markku, et al., "Review: Atomic layer deposition (ALD): from precursors to thin film structures." Thin Solid Films 409 (2002), pp.138-146.
	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.