

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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INTEL CORPORATION,  
Petitioner,

v.

DEMARAY LLC,  
Patent Owner.

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IPR2021-01031  
Patent 7,381,657 B2

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Before CHRISTOPHER L. CRUMBLEY, KRISTINA M. KALAN, and  
KIMBERLY McGRAW, *Administrative Patent Judges*.

McGRAW, *Administrative Patent Judge*.

DECISION  
Granting Institution of *Inter Partes* Review  
35 U.S.C. § 314  
Granting Motion for Joinder  
35 U.S.C. § 315(c)

## I. INTRODUCTION

On June 4, 2021, Intel Corporation (“Intel” or “Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–21 (“the Challenged Claims”) of U.S. Patent No. 7,381,657 B2 (Ex. 1001, “the ’657 patent”). See Paper 2 (“Pet.”); Paper 5 (Notice of Filing Date). Concurrently, Petitioner filed a Motion for Joinder seeking to join *Applied Materials, Inc. v. Demaray LLC*, IPR2021-00104 (the “Applied Materials IPR”). Paper 4 (the “Motion” or “Mot.”). *Inter partes* review was instituted in the Applied Materials IPR on May 11, 2021. See Applied Materials IPR, Paper 13 (PTAB May 11, 2021) (the “Applied Materials IPR Institution Decision”). The Petition here is substantively identical to the petition on which *inter partes* review was instituted in the Applied Materials IPR. See Mot. 3 (stating that the petition filed in this proceeding is substantively identical to the petition filed in the Applied Materials IPR and contains identical grounds, analysis, exhibits, and relies upon the same expert declarants and declarations). Demaray LLC (“Demaray” or “Patent Owner”) did not file a preliminary response to the Petition or an opposition to the Motion.

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314(b) (2018); 37 C.F.R. § 42.4(a) (2020). An *inter partes* review may not be instituted “unless . . . the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). And if we determine that a party has filed a petition that warrants institution of an *inter partes* review, we may join that party to another instituted *inter partes* review. 35 U.S.C. § 315(c).

Upon consideration of the Petition and the evidence of record, we conclude that the information presented shows a reasonable likelihood that

Petitioner would prevail in showing the unpatentability of at least one of the Challenged Claims. Accordingly, we authorize an *inter partes* review to be instituted as to the Challenged Claims of the '657 patent on the grounds raised in the Petition. This is not a final decision as to patentability of claims for which *inter partes* review is instituted. Any final decision will be based on the record, as fully developed during trial. We also grant the unopposed Motion and join Petitioner to the Applied Materials IPR (IPR2021-00104).

## II. BACKGROUND

### A. *The '657 Patent*

The '657 patent, titled "Biased Pulse DC Reactive Sputtering of Oxide Films," issued June 3, 2008, from Application No. 10/954,182, filed October 1, 2004. Ex. 1001, codes (10), (12), (21), (22), (45), (54). The '657 patent "relates to deposition of oxide and oxynitride films and, in particular, to deposition of oxide and oxynitride films by pulsed DC reactive sputtering." *Id.* at 1:11–13. The '657 patent discloses that RF sputtering has been typically used to deposit oxide dielectric films but arcing can occur between sputtering target tiles used to make such films, which causes contamination in the deposited films. *Id.* at 2:25–30. The '657 patent further states that reactors for RF sputtering, particularly their power systems, are complicated. *Id.* at 2:30–38. The '657 patent discloses that reactive dc magnetron sputtering of nonconductive oxides is done rarely because insulating surfaces accumulate charge during deposition that results in arcing, damage to the sputtering power supply, and the production of particles that degrade the properties of deposited oxide films. *Id.* at 4:48–57.

Figure 1A of the '657 patent is reproduced below.

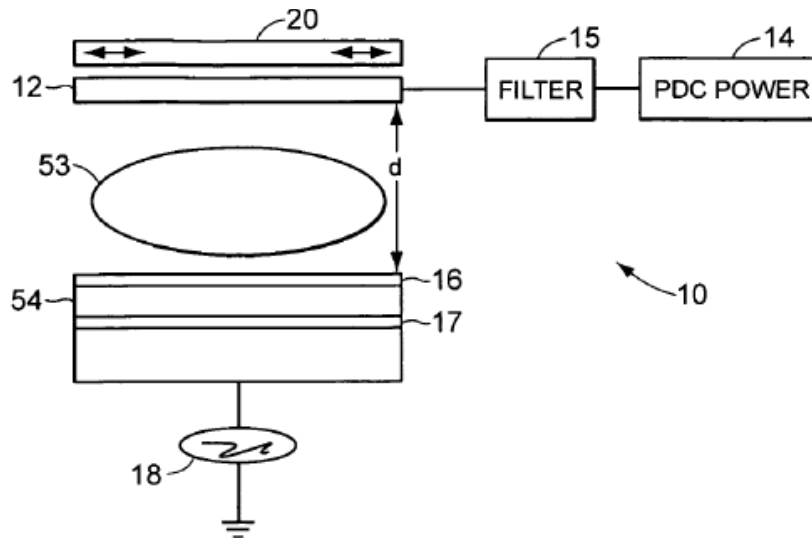


FIG. 1A

Figure 1A depicts a pulsed DC sputtering reactor.

The '657 patent describes reactor apparatus 10 for sputtering material from target 12. *Id.* at 5:13–15. Magnet 20 is used to scan across the top of the target 12, which reduces local erosion of target 12 during sputtering. *Id.* at 5:35, 8:57–66. Substrate 16 is opposite and parallel to target 12. *Id.* at 5:29–30. The substrate 16 is capacitively coupled to electrode 17 via insulator 54. *Id.* at 5:32–36. Electrode 17 can be coupled to RF power supply 18. *Id.* at 5:34–35. The '657 patent explains that RF power supply 18 is used to avoid columnar structures in a deposited film, which can be detrimental for optical wave guide applications. *Id.* at 5:66–6:6. The '657 patent discloses that target 12 functions as a cathode when power is applied to the target 12, which creates plasma 53. *Id.* at 5:30–32.

Target 12 is electrically coupled through filter 15 to pulsed DC power supply 14. *Id.* at 5:25–26. The '657 patent discloses that the polarity of the power supplied to target 12 by pulsed DC power supply 14 oscillates between negative and positive potentials. *Id.* at 5:36–39. According to the '657 patent, the insulating layer on the surface of target 12 discharges during

the positive period, which prevents arcing. *Id.* at 5:39–41. The '657 patent discloses that the pulsing frequency must exceed a critical frequency, which depends on a target material, cathode current, and reverse time. *Id.* at 5:41–43.

Reactor apparatus 10 further includes filter 15, which prevents the RF power supply from coupling to into pulsed DC power supply 14. *Id.* at 5:56–57. According to the '657 patent, filter 15 can be a rejection filter, such as a 2 MHz band rejection filter when a 2 MHz power supply is used for RF power supply 18. *Id.* at 5:57–61. The '657 patent discloses that the band width of filter 15 can be approximately 100 kHz. *Id.* at 5:61–63.

*B. Illustrative Claims*

Of the Challenged Claims, claims 1 and 2 are independent and are reproduced below with bracketed material and formatting added.

1[a]. A method of depositing a film on an insulating substrate, comprising:

[b] providing a process gas between a conductive target and the substrate;

[c] providing pulsed DC power to the target through a narrow band rejection filter such that the target alternates between positive and negative voltages;

[d] providing an RF bias at a frequency that corresponds to the narrow band rejection filter to the substrate;

[e] providing a magnetic field to the target; and

[f] reconditioning the target;

[g] wherein reconditioning the target includes reactive sputtering in the metallic mode and then reactive sputtering in the poison mode.

Ex. 1001, 23:2–14.

2[a]. A method of depositing an insulating film on a substrate, comprising:

- [b] providing a process gas between a target and a substrate;
- [c] providing pulsed DC power to the target through a narrow band rejection filter such that the voltage on the target alternates between positive and negative voltages;
- [d] providing an RF bias that corresponds to the narrow band rejection filter to the substrate; and
- [e] providing a magnetic field to the target;
- [f] wherein an oxide material is deposited on the substrate, and the insulating film is formed by reactive sputtering in a mode between a metallic mode and a poison mode.

Ex. 1001, 23:16–27.

*C. The Asserted Grounds of Unpatentability*

Petitioner asserts that claims 1–21 of the '657 patent are unpatentable based on the following grounds, which are the same grounds asserted in the Applied Materials IPR (Pet. 1, 4–5):

Reference(s)	Basis <sup>1</sup>	Claim(s) Challenged
Barber, <sup>2</sup> Hirose <sup>3</sup>	§ 103	2–4, 6, 8, 10–12, 21
Barber, Hirose, Dogheche <sup>4</sup>	§ 103	5, 7
Barber, Hirose, Safi <sup>5</sup>	§ 103	9

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<sup>1</sup> The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 103 effective March 16, 2013. Because the '657 patent has an effective filing date prior to the effective date of the applicable AIA amendment, we refer to the pre-AIA versions of § 103.

<sup>2</sup> US 6,342,134 B1, issued Jan. 29, 2002 (Ex. 1005).

<sup>3</sup> US 6,485,602 B2, issued Nov. 26, 2002 (Ex. 1006).

<sup>4</sup> E. Dogheche, *Growth and Optical Characterization of Aluminum Nitride Thin Films Deposited on Silicon by Radio-Frequency Sputtering*, Appl. Phys. Lett. 74, 1209 (1999) (Ex. 1029).

<sup>5</sup> I. Safi, *A Novel Reactive Magnetron Sputtering Technique for Producing Insulating Oxides of Metal Alloys and Other Compound Thin Films*, Surface and Coatings Tech. 135, 48 (2000) (Ex. 1039).

Reference(s)	Basis <sup>1</sup>	Claim(s) Challenged
Barber, Hirose, Aokura <sup>6</sup>	§ 103	12, 13
Barber, Hirose, Segal <sup>7</sup>	§ 103	14–18
Barber, Hirose, Segal, Sakawaki <sup>8</sup>	§ 103	19
Barber, Hirose, Sill <sup>9</sup>	§ 103	20
Barber, Hirose, Sellers <sup>10</sup>	§ 103	1
Barber, Hirose, Belkind <sup>11</sup>	§ 103	2–4, 6, 8, 10, 11, 12, 21
Barber, Hirose, Belkind, Dogheche	§ 103	5, 7
Barber, Hirose, Belkind, Safi	§ 103	9
Barber, Hirose, Belkind, Aokura	§ 103	12, 13
Barber, Hirose, Belkind, Segal	§ 103	14–18
Barber, Hirose, Belkind, Segal, Sakawaki	§ 103	19
Barber, Hirose, Belkind, Sill	§ 103	20
Barber, Hirose, Belkind, Sellers	§ 103	1

In support of its unpatentability arguments, Petitioner relies on the declaration of Vivek Subramanian, Ph.D. (Ex. 1002).

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<sup>6</sup> JP H10102247 A, published Apr. 21, 1998 (Ex. 1068) ((English translation (pp. 1–12); Verified Statement of Translation (p. 12); Japanese language document (pp. 14–24).

<sup>7</sup> US 2001/0047838 A1, published Dec. 6, 2001 (Ex. 1069).

<sup>8</sup> US 2001/0031383 A1, published Oct. 18, 2001 (Ex. 1043).

<sup>9</sup> US 6,284,110 B1, issued Sept. 4, 2001 (Ex. 1057).

<sup>10</sup> US 5,651,865, issued July 29, 1997 (Ex. 1007).

<sup>11</sup> A. Belkind et al., *Pulsed-DC Reactive Sputtering of Dielectrics: Pulsing Parameter Effects*, Society of Vacuum Coaters, 43<sup>rd</sup> Annual Technical Conference Proceedings, 86 (2000) (Ex. 1008).

*D. Related Proceedings*

Petitioner identifies the following two *inter partes* proceedings as related matters involving the '657 patent: (1) *Applied Materials, Inc. v. Demaray LLC*, IPR2021-00104 (PTAB) (institution granted) and (2) *Applied Materials, Inc. v. Demaray LLC*, IPR2021-00106 (PTAB) (institution denied). Petitioner also states it filed a petition seeking *inter partes* review of U.S. Patent No. 7,544,276. Pet. 2; *see also Intel Corp. v. Demaray LLC*, IPR2021-01030, Paper 2 (petition challenging claims of the '276 patent).

In addition, Petitioner identifies the following four district court proceedings as related matters involving both the '657 patent and the '276 patent: (1) *Demaray LLC v. Samsung Electronics Co., Ltd. et al.*, Case No. 6-20-cv-00636 (W.D. Tex.); (2) *Demaray LLC v. Intel Corporation*, Case No. 6-20-cv-00634 (W.D. Tex.); (3) *Applied Materials, Inc. v. Demaray LLC*, Case No. 5-20-cv-05676 (N.D. Cal.) (terminated); and (4) *Applied Materials, Inc. v. Demaray LLC*, Case No. 5-20-cv-09341 (N.D. Cal.). Pet. 2.

*E. Real Parties in Interest*

Petitioner identifies Intel Corporation, Applied Materials, Inc., Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., Samsung Semiconductor, Inc., and Samsung Austin Semiconductor, LLC as the real parties-in-interest. Pet. 2.

III. ANALYSIS OF THE PETITION

The Petition is substantively identical to the petition in the Applied Materials IPR. *See* Mot. 3 (stating that the Petition and the Applied Materials Petition are identical in all substantive respects and that they include “identical grounds, analysis, and exhibits and rel[y] upon the same



expert declarants and declarations”). For the same reasons provided in the Applied Materials IPR Institution Decision (Applied Materials IPR, Paper 13), which we incorporate expressly herein, we find that Petitioner demonstrates a reasonable likelihood of prevailing with respect to at least one of the Challenged Claims of the ’657 patent.

#### IV. ANALYSIS OF MOTION

Acting under the designation of the Director, we have discretion to determine whether to join a party to an instituted *inter partes* review. 35 U.S.C. § 315(c); 37 C.F.R. § 42.122(a). We may join as a party to [an instituted] *inter partes* review any person who properly files a petition under section 311 that, after receiving a preliminary response under section 313 or the expiration of the time for filing such a response, warrants the institution of an *inter partes* review under section 314. 35 U.S.C. § 315(c). “Any request for joinder must be filed . . . no later than one month after the institution date of any *inter partes* review for which joinder is requested.” 37 C.F.R. § 42.122(b). Petitioner shows that the Motion is timely as it was filed within one month of the Applied Materials IPR Institution Decision. *See* Pet. 1 (stating the Petition is filed within one month of the institution of the Applied Materials IPR).

In deciding whether to grant a motion for joinder, the Board has considered (1) Petitioner’s explanation why joinder is appropriate, (2) whether any new grounds of unpatentability are asserted in the second petition, (3) what impact, if any, joinder would have on the cost and schedule for the existing proceeding, and (4) whether granting joinder will add to the complexity of briefing and/or discovery. *See* Consolidated Trial Practice Guide, 76 (Nov. 2019)

(<https://www.uspto.gov/TrialPracticeGuideConsolidated>) (citing *Kyocera Corp. v. Softview LLC*, IPR2013-00004, Paper 15, 4 (PTAB Apr. 24, 2013)).

As for why joinder is appropriate, Petitioner states that joinder will streamline the proceedings and reduce costs and burden on the parties without any prejudice to Patent Owner. Mot. 5; *see also* Mot. 2–3 (stating that given the duplicative nature of the petitions, maintaining this proceeding separate from that of the Applied Materials IPR would entail needless duplication of efforts). Petitioner also explains that there are no new grounds of unpatentability asserted in the second petition as “the petitions are identical.” *Id.* at 4.

Regarding what impact, if any, joinder would have on the cost, schedule, or complexity of the existing proceeding, Petitioner states that joinder will simplify briefing and discovery because Petitioner and Applied Materials will engage in consolidated filings and discovery. Mot. 5. Petitioner agrees not to make any arguments separate from those advanced by Petitioner and Applied Materials in the consolidated filings, except for those that do not involve the other party. *Id.* at 4. Petitioner further explains that Petitioner and Applied Materials are using the same expert declarants who have submitted the same, identical declarations in the proceedings. *Id.* Petitioner further states that it and Applied Materials will designate an attorney to conduct the cross-examinations of any Patent Owner’s witness and the redirect of any Petitioner or Applied Materials witness without any additional or separate cross-examination or redirect time. *Id.* Petitioner also states that the scheduling order for the Applied IPR will apply for the joined proceedings. *Id.* at 6.

Patent Owner did not file an opposition to the Motion. In view of Petitioner's representations, we are persuaded that joinder is appropriate. We, therefore, *grant* the Motion.

## V. CONCLUSION

Based on the evidence before us, we determine Petitioner demonstrates a reasonable likelihood of prevailing in its assertions that the Challenged Claims of the '657 patent are unpatentable over the asserted prior art. Accordingly, *inter partes* review shall proceed in this case on all of the grounds raised in the Petition. *See SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018) (holding that a decision to institute under 35 U.S.C. § 314 may not institute on fewer than all claims challenged in the petition); *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (stating the decision whether to institute *inter partes* review requires “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”).

Our determination in this Decision is not a final determination on either the patentability of any challenged claims or the construction of any claim term and, thus, leaves undecided any remaining fact issues necessary to determine whether sufficient evidence supports Petitioner's contentions by a preponderance of the evidence in the final written decision. *See Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016) (noting that “there is a significant difference between a petitioner's burden to establish a ‘reasonable likelihood of success’ at institution, and actually proving invalidity by a preponderance of the evidence at trial”) (quoting 35 U.S.C. § 314(a) and comparing *id.* § 316(e)).

We also find that Petitioner has made a sufficient showing in support of its unopposed Motion for Joinder. Accordingly, we *grant* Petitioner's Motion for Joinder and join Petitioner to IPR2021-00104.

## VI. ORDER

Upon consideration of the record before us, it is:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–21 of U.S. Patent No. 7,381,657 B2 is instituted with respect to all grounds set forth in the Petition;

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of U.S. Patent No. 7,381,657 B2 shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial;

FURTHER ORDERED that, pursuant to 35 U.S.C. § 315(c) and 37 C.F.R. § 42.122(a), Petitioner's Motion for Joinder is granted, and Petitioner is joined as a petitioner in IPR2021-00104;

FURTHER ORDERED that, in view of the joinder, all further filings shall be made only in IPR2021-00104;

FURTHER ORDERED that the asserted grounds of unpatentability on which the Board instituted *inter partes* review in IPR2021-00104 are unchanged and remain the only instituted grounds;

FURTHER ORDERED that the Scheduling Order in IPR2021-00104, and any modifications thereto, shall govern the schedule of the joined proceeding;

FURTHER ORDERED that, in IPR2021-00104, Petitioner will file each paper, except for any paper that does not involve the other party, as a single, consolidated filing with Applied Materials, Inc., subject to the page

limits set forth in 37 C.F.R. § 42.24, and shall identify such filing as a consolidated filing;

FURTHER ORDERED that, for any consolidated filing, if Petitioner wishes to file an additional paper to address points of disagreement with Applied Materials, Inc., Petitioner must request authorization from the Board to file a motion for an additional paper or pages;

FURTHER ORDERED that Petitioner shall collectively designate attorneys with Applied Materials, Inc. to conduct the cross-examination of any witness produced by Patent Owner and the redirect of any witness produced by Applied Materials, Inc. and Petitioner, within the timeframes set forth in 37 C.F.R. § 42.53(c) or agreed to by the parties;

FURTHER ORDERED that Petitioner shall collectively designate attorneys with Applied Materials, Inc. to present at the oral hearing, if requested and scheduled, in a consolidated argument;

FURTHER ORDERED that the caption in IPR2021-00104 shall be changed to reflect joinder of Petitioner in accordance with the attached example; and

FURTHER ORDERED that a copy of this Decision shall be entered into the record of IPR2021-00104.

IPR2021-01031  
Patent 7,381,657 B2

FOR PETITIONER:

David Cavanaugh  
Richard Goldenberg  
WILMER CUTLER PICKERING HALE AND DORR LLP  
david.cavanaugh@wilmerhale.com  
richard.goldenberg@wilmerhale.com

FOR PATENT OWNER:

Hong Zhong  
Benjamin Hattenbach  
Crawford Wells  
IRELL & MANELLA LLP  
hzhong@irell.com  
bhatenbach@irell.com  
mwells@irell.com

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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APPLIED MATERIALS, INC. and INTEL CORPORATION,  
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DEMARAY LLC,  
Patent Owner.

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IPR2021-00104<sup>12</sup>  
Patent 7,381,657 B2

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Before CHRISTOPHER L. CRUMBLEY, KRISTINA M. KALAN, and  
KIMBERLY McGRAW, *Administrative Patent Judges*.

McGRAW, *Administrative Patent Judge*.

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<sup>12</sup> Intel Corporation has filed a petition in IPR2021-01031 and has been joined as a petitioner in this proceeding