

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TOKYO ELECTRON LIMITED,
Petitioner,

v.

DANIEL L. FLAMM,
Patent Owner.

Case IPR2017-01072
Patent RE40,264 E

Before CHRISTOPHER L. CRUMBLEY, JO-ANNE M. KOKOSKI, and
KIMBERLY McGRAW, *Administrative Patent Judges*.

McGRAW, *Administrative Patent Judge*.

DECISION

Denying Institution of *Inter Partes* Review
35 U.S.C. § 314(a) and 37 C.F.R. § 42.108

I. INTRODUCTION

Tokyo Electron Ltd. (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 13–26, 64, and 65 (“the challenged claims”) of U.S. Patent No. RE40,264 E (Ex. 1001, “the ’264 patent”). Paper 1 (“Pet.”). Daniel L. Flamm (“Patent Owner”) filed a Preliminary Response. Paper 5 (“Prelim. Resp.”).

Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted unless the information presented in the Petition shows “there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” Taking into account the arguments presented in the Petition and Preliminary Response, we conclude that Petitioner has not established a reasonable likelihood of prevailing with respect to the unpatentability of claims 13–26, 64, and 65. Accordingly, we do not institute an *inter partes* review on those claims.

A. Related Matters

The parties indicate that the ’264 patent is asserted in the following proceedings in the Northern District of California, which are currently stayed: Case Nos. 5:16-cv-01578-BLF, 5:16-cv-1579-BLF, 5:16-cv-1580-BLF, 5:16-cv-1581-BLF, 5:16-cv-02252-BLF,¹ and was the subject of a declaratory judgment action in 5:15-cv-01277-BLF, which was dismissed with prejudice. See Pet. 2; Paper 4, 1.

¹ Petitioner states that *Daniel L. Flamm v. Samsung Electronics Co.*, 1:15-cv-613-LY (E.D. Tex.) was transferred to the Northern District of California and is now pending under Case No. 5:16-cv-2252-BLF (N.D. Cal.). Pet. 2.

Claims of the '264 patent have been the subject of other *inter partes* review proceedings brought by different petitioners, including proceedings in which the Board denied institution of *inter partes* review (i.e., IPR2015-01759, IPR2015-01766, IPR2016-00468, IPR2016-00469, and IPR2016-00470, IPR2016-01510), and proceedings in which the Board did institute *inter partes* review but the parties reached settlement prior to the issuance of a final written decision by the Board (i.e., IPR2015-01764, IPR2015-01768). The '264 patent is also the subject of the following *inter partes* review proceedings that are currently pending: IPR2017-00279, IPR2017-00280, IPR2017-00281, and IPR2017-00282.²

B. The '264 Patent

The '264 patent, titled "Multi-Temperature Processing," reissued April 29, 2008 from U.S. Patent Application No. 10/439,245 ("the '245 application"), filed on May 14, 2003. Ex. 1001, at [54], [45], [21], [22]. The '264 patent is a reissue of U.S. Patent No. 6,231,776 B1 ("the '776 patent"), which issued on May 15, 2001, from U.S. Patent Application No. 09/151,163 ("the '163 application") filed September 10, 1998. *Id.* at [64]. The '264 patent is directed to a method "for etching a substrate in the manufacture of a device," where the method "provide[s] different processing temperatures during an etching process or the like." *Id.* at Abstract. The apparatus used in the method is shown in Figure 1, reproduced below.

² Case Nos. IPR2017-01749, IPR2017-01750, IPR2017-01751, and IPR2017-01752 have been terminated, and the Petitioner of these proceedings has been joined as a party to IPR2017-00279, IPR2017-00280, IPR2017-00281, and IPR2017-00282, respectively.

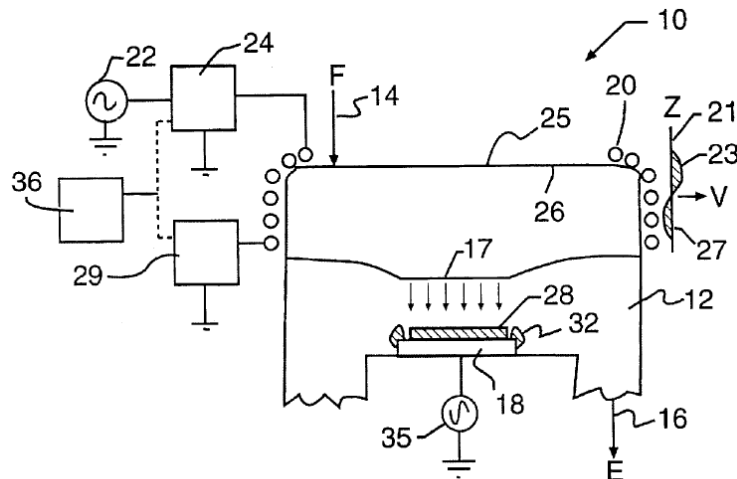
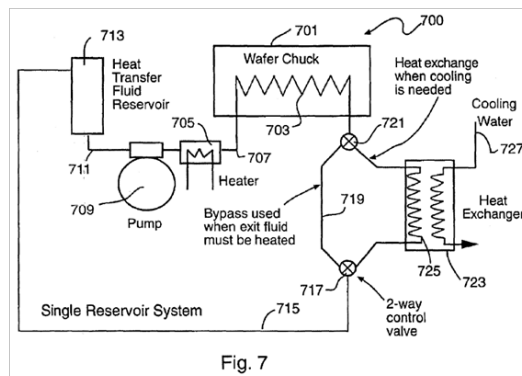
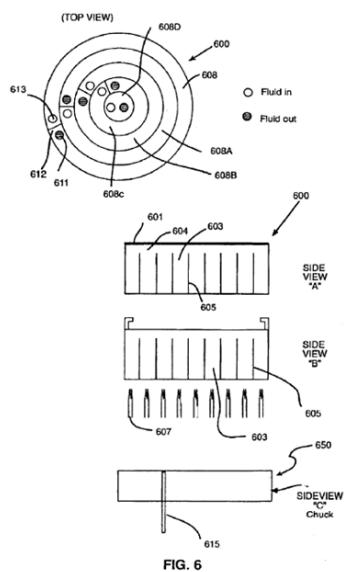


FIG. 1

Figure 1 depicts a substrate (product 28, such as a wafer to be etched) on a substrate holder (product support chuck or pedestal 18) in a chamber (chamber 12 of plasma etch apparatus 10). *Id.* at 3:24–25, 3:32–33, 3:40–41.

Figures 6 and 7, reproduced below, depict a temperature-controlled substrate holder and temperature control systems.



Figures 6 and 7 depict temperature-controlled fluid flowing through substrate holder (600, 701), guided by baffles 605, where “[t]he fluid [is]

used to heat or cool the upper surface of the substrate holder.” Ex. 1001, 14:28–63, 16:5–67. Figure 6 also depicts heating elements 607 underneath the substrate holder, where “[t]he heating elements can selectively heat one or more zones in a desirable manner.” *Id.* at 15:10–26. Referring to Figure 7, the operation of the temperature control system is described as follows:

The desired fluid temperature is determined by comparing the desired wafer or wafer chuck set point temperature to a measured wafer or wafer chuck temperature The heat exchanger, fluid flow rate, coolant-side fluid temperature, heater power, chuck, etc. should be designed using conventional means to permit the heater to bring the fluid to a setpoint temperature and bring the temperature of the chuck and wafer to predetermined temperatures within specified time intervals and within specified uniformity limits.

Id. at 16:36–39, 16:50–67.

An example of a semiconductor substrate to be patterned is shown in Figure 9, reproduced below.

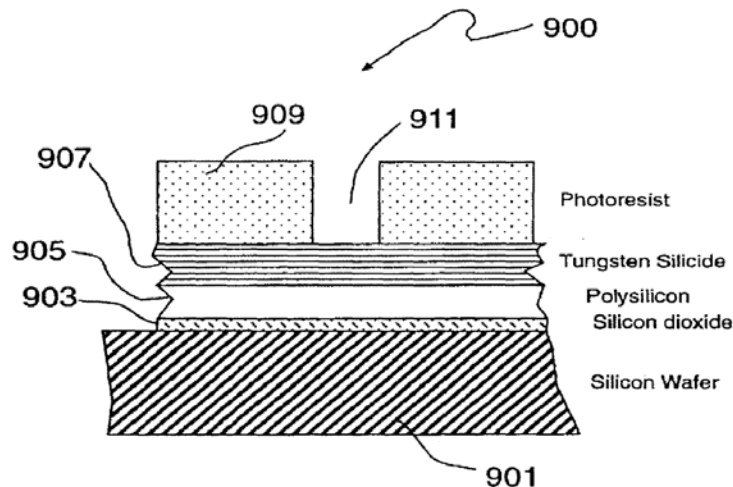


Figure 9 depicts substrate 901 having a stack of layers including oxide layer 903, polysilicon layer 905, tungsten silicide layer 907, and photoresist masking layer 909 with opening 911, from the treatment method shown in

Figure 10, reproduced below. *Id.* at 17:58–18:57.

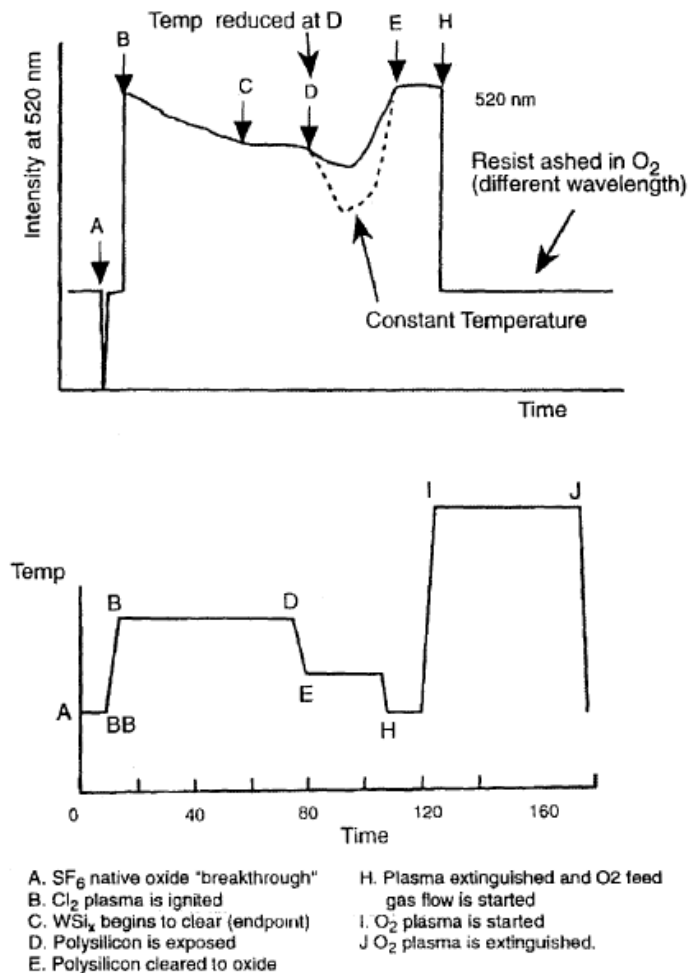


Fig. 10

Figure 10 depicts the tungsten silicide layer being etched between points B and D at a constant temperature; the polysilicon layer being exposed between Points D and E; the polysilicon layer being etched at a constant temperature beyond point E; and the resist being ashed beyond Point I. Ex. 1001, 18:58–19:64. The plasma's optical emission at 530 nanometers is monitored to determine when there is breakthrough to the

polysilicon layer (Point D) and a lower etch temperature is required to etch the polysilicon layer (Point E). *Id.* at 19:8–24, 19:45–52.

C. Illustrative Claim

Of the challenged claims, claim 13 is the only independent claim at issue. Claim 13 is directed to a method of etching a substrate and is reproduced below:³

13. A method of etching a substrate in the manufacture of a device, the method comprising:
 - [a] placing a substrate having a film thereon on a substrate holder in a chamber, the substrate holder having a selected thermal mass;
 - [b] setting the substrate holder to a selected first substrate holder temperature with a heat transfer device;
 - [c] etching a first portion of the film while the substrate holder is at the selected first substrate holder temperature;
 - [d] with the heat transfer device, changing the substrate holder temperature from the selected first substrate holder temperature to a selected second substrate holder temperature; and
 - [e] etching a second portion of the film while the substrate holder is at the selected second substrate holder temperature;
 - [f] wherein the thermal mass of the substrate holder is selected for a predetermined temperature change within a specific interval of time during processing; the predetermined temperature change comprises the change from the selected first substrate holder temperature to the selected second substrate holder temperature, and the specified time interval comprises the time for changing from the selected first substrate holder temperature to the selected second substrate holder temperature.

³ Bracketed material added.

D. Asserted Grounds of Unpatentability

Petitioners challenge claims 13–26, 64, and 65 of the ’264 patent based on the asserted grounds of unpatentability (“grounds”) set forth in the table below. Pet. 5–6.

Reference(s)	Basis	Challenged Claim(s)
Kadomura ⁴	§ 102	13
Kadomura & Matsumura ⁵	§ 103	13
Okada ⁶	§ 102	13
Okada, Matsumura, and Kadomura	§ 103	13, 14–16, 19–23, 64–65
Kadomura, Okada, Matsumura, and Kaji ⁷	§ 103	17, 18
Kadomura, Okada, Matsumura, and Okada 2 ⁸	§ 103	24
Kadomura, Okada, Matsumura, and Edamura ⁹	§ 103	25, 26

⁴ US 5,981,913, filed Mar. 20, 1997, issued Nov. 9, 1999 (Ex. 1003, “Kadomura”).

⁵ Japanese Pub. No. 3-196206, published Aug. 27, 1991 (Ex. 1005; Ex. 1006 (English translation), “Matsumura”). Unless otherwise indicated, citations to foreign language documents will be made to the English translation of the document.

⁶ Japanese Pub. No. 5-136095, published June 1, 1993 (Ex. 1003; Ex. 1004 (English translation), “Okada”).

⁷ Japanese Pub. No. 3-145123, published June 20, 1991 (Ex. 1011; Ex. 1012 (English translation), “Kaji”).

⁸ Japanese Pub. No. 5-243191, published September 21, 1993 (Ex. 1009; Ex. 1010 (English translation), “Okada 2”).

⁹ Japanese Pub. No. 8-191059, published July 23, 1996 (Ex. 1007; Ex. 1008 (English translation), “Edamura”).

II. ANALYSIS

A. Claim Construction

The '264 patent has expired.¹⁰ For claims of an expired patent, the Board's claim interpretation is similar to that of a district court. *See In re Rambus, Inc.*, 694 F.3d 42, 46 (Fed. Cir. 2012). In construing a claim term, we must look at the term's ordinary and customary meaning, as understood by a person of ordinary skill in the art, in the context of the written description and the prosecution history. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). Only those terms in controversy need to be construed, and only to the extent necessary to resolve the controversy. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Petitioner proffers constructions for several phrases found in claim 13, namely: "substrate holder," "heat transfer device," "selected thermal mass," "selected first substrate holder temperature," "selected second substrate holder temperature," "predetermined temperature change," "specific internal of time," and "specified time interval." *See, e.g.*, Pet. 19–24. Patent Owner does not propose explicit claim constructions for any claim terms. *See*

¹⁰ The '264 patent expired no later than December 4, 2015, which is twenty years after December 4, 1995, the earliest filing date of an application to which the '264 claims priority. *See* Ex. 1001 [63]; 35 U.S.C. § 154(a)(2) (2012 & Supp. III 2015) (stating patent term ends twenty (20) years from the date on which the application for the patent was filed in the United States, "or, if the application contains a specific reference to an earlier filed application or applications under section 120, 121, 365(c), or 386(c), from the date on which the earliest such application was filed").

Prelim. Resp. For purposes of this Decision, based on the record before us, we address the interpretation of the terms “substrate holder,” “heat transfer device,” and “selected thermal mass.”

1. *Whether a “heat transfer fluid” is a required element of the claims*

Petitioner proposes two alternative claim interpretations for the terms “substrate holder,” “heat transfer device,” and “selected thermal mass.” Petitioner’s “second interpretation” for each term requires the involvement of a “heat transfer fluid.” Pet. 19–23. For example, Petitioner proposes construing “substrate holder” as a “support structure for holding a substrate and containing a *heat transfer fluid* responsible for changing the temperature of the support structure by changing the temperature of the heat transfer fluid.” *Id.* at 20–21. Similarly, Petitioner argues that “heat transfer device” should be construed as “[o]ne or more elements located within and/or external to the substrate holder for changing a temperature of the *heat transfer fluid* to change the temperature of the substrate holder” and that “selected thermal mass” should be construed as “allowing or facilitating a predetermined temperature change in a specified interval of time with the temperature of the substrate holder changed by changing the temperature of the *heat transfer fluid*.” *Id.* at 21–23. To support its argument that each of these claim terms requires involvement of a heat transfer fluid, Petitioner argues that in every embodiment disclosed in the ’264 patent, the temperature of the substrate holder is changed by changing the temperature of the heat transfer fluid that passes through the substrate holder. *Id.* at 20–23.

We do not construe these limitations as requiring the involvement of a heat transfer fluid. “Heat transfer fluid” is not recited in the claims. Although the claims are interpreted in light of the specification, it is improper to read limitations from the specification into the claims. *See, e.g., In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993); *see also Thorner v. Sony Computer Ent. Am. LLC*, 669 F.3d 1362, 1366 (Fed. Cir. 2012) (“It is likewise not enough that the only embodiments, or all of the embodiments, contain a particular limitation. We do not read limitations from the specification into claims; we do not redefine words.”). As such, we are not persuaded that the phrases “substrate holder,” “heat transfer device,” and “selected thermal mass,” as recited in claim 13, should be construed as requiring the involvement of “heat transfer fluid.”

2. “*selected thermal mass*”

Claim 13 requires that the substrate holder “hav[e] a *selected thermal mass* . . . wherein the *thermal mass* of the substrate holder is *selected for a predetermined temperature change within a specific interval of time*; the predetermined temperature change comprises the change from the selected first substrate holder temperature to the selected second substrate holder temperature, and the specified time interval comprises the time for changing from the selected first substrate holder temperature to the selected second substrate holder temperature.” Ex. 1001, 21:1–10 (emphasis added). In our Decision Denying Institution of *Inter Partes* Review in Case IPR2015-01759, we construed the phrase “*selected thermal mass*” of claim 13 of the ’264 patent as the “thermal mass selected by selecting the mass of the substrate holder, the material of the substrate holder, or both.” *Lam*

Research Corp. v. Flamm, IPR2015-01759 (PTAB Feb. 24, 2016) (Paper 7) (Ex. 1016, 13).

Petitioner’s proposed construction for the phrase “selected thermal mass” includes the Board’s previous construction from Case IPR2015-01759, but with the “additional clarification” that the “thermal mass is not a unique selection for a particular temperature change and a specified interval of time, but rather, need only allow or facilitate a predetermined temperature change in a specified interval of time.” Pet. 22–23 (citing Ex. 1016, 11; Ex. 1013 ¶¶ 85–89). To support this construction, Petitioner argues that, according to the ’264 patent, (1) the thermal mass of the substrate merely *facilitates* or *allows* a predetermined temperature change in a specified time interval, (2) other factors, such as the amount of heat supplied, also control the predetermined temperature change in a specified time interval, and (3) a given substrate holder can be utilized for multiple different temperature changes. *Id.* at 22 (citing Ex. 1001, Abstract, 2:51–57, 16:42–46, 16:60–67, 19:8–12, 19:48–52, Fig. 10; Ex. 1013 ¶¶ 58–89); Ex. 1001, 16:60–67 (stating that the “heat exchanger, fluid flow rate, coolant-side fluid temperature, heater power, chuck, etc. should be designed to bring the fluid to a setpoint temperature and bring the temperature of the chuck and wafer to predetermined temperatures within specified time intervals and within specified uniformity limits”).

Patent Owner does not provide an explicit construction for these phrases but implicitly construes “selected thermal mass” to require that the selection of the thermal mass of the substrate holder is based on a predetermined temperature change and interval of time. *See* Prelim. Resp. 6 (arguing that Kadomura “does not teach that the substrate’s thermal mass is

‘selected’ for a predetermined temperature change within a specific interval of time”). Patent Owner also appears to implicitly construe claim 13 as requiring that a different, or unique, thermal mass must be selected for different sets of temperature changes over time. *Id.* (distinguishing claim 13 over Kadomura by stating “[r]ather than selecting the thermal mass of the substrate holder for the particular desired temperatures for the two etches, Kadomura teaches using the same substrate holder for different sets of temperatures”).

To the extent Petitioner is arguing that the selection of the thermal mass of the substrate holder, as required by claim 13, does not require basing selection of the thermal mass of the substrate holder on a predetermined temperature change of the substrate holder from the first selected substrate holder temperature to the selected second substrate holder temperature within a specific interval of time, we do not agree with this construction because it is inconsistent with the language of the full scope of claim 13. Specifically, step [f] of claim 13 recites that the:

thermal mass is selected for a predetermined temperature change within a specified interval of time during processing; the predetermined temperature change comprises the change from the selected first substrate holder temperature to the selected second substrate holder temperature, and the specified time interval comprises the time for changing from the selected first substrate holder temperature to the selected second substrate holder temperature.

Ex. 1001, 21:1–10.

Thus, the ordinary meaning of the claim language itself requires predetermining the temperature change (i.e., the change from the selected first substrate holder temperature to the selected second substrate holder

temperature) within a specific interval of time (i.e., the time for changing from the selected first substrate holder temperature to the selected second substrate holder temperature), and based on that predetermination, selecting the thermal mass of the substrate holder. A construction that does not require selecting a thermal mass for a particular temperature change and a specified interval of time, as opposed to selecting a thermal mass that can *facilitate or allow* a temperature change, is not consistent with the plain and ordinary meaning of the claim.

We recognize that the thermal mass of a substrate holder is not the only factor that controls the rate of temperature change of the substrate holder. *See, e.g.*, Ex. 1001, 16:60–67 (stating that the “heat exchanger, fluid flow rate, coolant-side fluid temperature, heater power, chuck, etc. should be designed to bring the fluid to a setpoint temperature and bring the temperature of the chuck and wafer to predetermined temperatures within specified time intervals and within specified uniformity limits”). The plain language of the claim, however, still requires that the thermal mass of the substrate holder be *selected* for a predetermined temperature change within the specific interval of time.

Our construction is also consistent with the prosecution history of the '264 patent. During the Reissue Proceeding of the '245 application which gave rise to the '264 patent, Patent Owner amended claim 56, which ultimately issued as claim 13, to replace language stating the thermal mass of the substrate holder “is selected *to allow changing* the first substrate holder temperature to the second substrate holder temperature within a selected time period” with the additional limitations of step [f] recited above. Nov. 20, 2006 Amendment under 37 C.F.R. § 1.11, pp. 2–3. (Ex. 3001). As

a result of this amendment, the Examiner withdrew a § 102 anticipation rejection over Japanese Publication No. 59-076876. May 30, 2007 Final Office Action (Ex. 3002, 4). The Examiner stated that “[a]pplicant’s point is well taken that JP-076876 does not teach *selecting a thermal mass based on a predetermined temperature change and specified interval of time processing, as in the context of claim 56.*” *Id.* (emphasis added). The Examiner further stated that “[a]lthough such a thermal mass may be inherent, there is no teaching to *predetermine a temperature change and interval of time, and based on that, to select the thermal mass of the substrate holder.*” *Id.* (emphasis added).

To the extent Patent Owner argues that the “thermal mass of the substrate holder is selected for” language of claim 13 requires that a unique thermal mass of a substrate holder be selected for different sets of temperature changes within specified time intervals (e.g., a particular thermal mass cannot be selected for different sets of temperatures), we disagree. See Prelim. Resp. 6. The plain language of the claim does not require that a different substrate holder or “unique” thermal mass be selected for each predetermined particular temperature change over specified time intervals. Patent Owner does not direct us to, nor do we see, language in the ’264 patent that supports such a construction.

For the foregoing reasons, we construe *selected thermal mass* as “thermal mass selected by selecting the mass of the substrate holder, the material of the substrate holder, or both.” We further construe the remaining limitations of step [f] requiring that the thermal mass of the substrate holder *is selected for a predetermined temperature change within a specified interval of time during processing; the predetermined*

temperature change comprises the change from the selected first substrate holder temperature to the selected second substrate holder temperature, and the specified time interval comprises the time for changing from the selected first substrate holder temperature to the selected second substrate holder temperature

as meaning that “the temperature change from the first substrate holder temperature to the second substrate holder temperature within a specified interval of time is predetermined, and based on that predetermination, the thermal mass of the substrate holder is selected.”

3. Remaining Claim Terms

For purposes of this Decision, based on the record before us, we determine that none of the remaining claim terms require an explicit construction. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

B. Priority Date for the Challenged Claims of the ’264 Patent

The ’264 patent reissued from the ’245 application, filed on May 14, 2003. Ex. 1001, [21], [22]. The ’245 application is a reissue of the ’776 patent, which issued May 15, 2001 from the ’163 application, which was filed September 10, 1998. *Id.* at [64]. The ’163 application is a continuation-in-part of the following two applications: (1) U.S. Provisional Application No. 60/058,650 (“the ’650 provisional application”), filed on September 11, 1997; and (2) U.S. Patent Application No. 08/567,224 (“the ’224 application”), filed on December 4, 1995. *Id.* at [60], [63], 1:11–15.

Petitioner contends that September 11, 1997, the filing date of the ’650 provisional application, is the earliest possible priority date for the challenged claims, arguing that the ’224 application, filed on December 4,

1995, does not disclose the claimed subject matter. Pet. 4–5. Relying upon the testimony of its Declarant, Mark Kushner Ph.D. (Ex. 1013 “the Kushner Declaration”), Petitioner contends the ’224 application fails to disclose changing the temperature between two etching steps or selecting a thermal mass. *Id.* (citing Ex. 1013 ¶¶ 33–37). Petitioner also cites to our Decision Denying Institution of *Inter Partes* Review in Case IPR2016-01510 (Ex. 1018), in which we found, *inter alia*, that claims 13–26, 64, and 65 are not entitled to a filing date earlier than the September 11, 1997 filing date of the ’650 provisional application. *Samsung Electronics Co., Ltd. v. Flamm*, IPR2016-01510 (PTAB Feb. 14, 2017) (Paper 6). Petitioner asserts that, because the ’224 application does not provide sufficient written description support for certain limitations required by independent claim 13, the challenged claims only are entitled to the priority date of the ’650 provisional application (i.e., September 11, 1997). Pet. 4–5. Patent Owner does not argue that the ’264 patent is entitled to claim a priority date earlier than September 11, 1997.

On this record, we are persuaded by Petitioner’s argument that the ’224 application does not provide sufficient written description support for the full scope of independent claim 13, and, therefore, the challenged claims of the ’264 patent are not entitled to claim priority to the December 4, 1995 filing date of the ’224 application.

C. Prior Art Status of Matsumura and Okada 2

As an initial matter, we address whether Petitioner has made a threshold showing that each of the asserted references qualify as prior art under 35 U.S.C. § 102. Pre-AIA 35 U.S.C. § 102 states that:

A person shall be entitled to a patent unless —

(a) the invention was . . . described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was . . . described in a printed publication in this or a foreign country . . . more than one year prior to the date of the application for patent in the United States.

Patent Owner contends that Petitioner has not established that Matsumura or Okada 2 qualify as prior art, arguing that both references are Japanese Laid Open Publications and that “[o]lder cases have held that laid open patent applications are not ‘published’ and cannot constitute prior art.” Prelim. Resp. 10–11 (citing *Ex parte Haller*, 103 USPQ2d 332 (Bd. App. 1953)). Patent Owner further argues that Matsumura and Okada 2 “were *in accessible*; resided in the Japanese Patent Office and were not translated into English.” Prelim. Resp. 11.

As noted above, the challenged claims only are entitled to the priority date of the ’650 provisional application (i.e., September 11, 1997). We determine that Petitioner has made a threshold showing that both Matsumura and Okada 2 were both published more than one year before September 11, 1997, and therefore qualify as prior art printed publications under 35 U.S.C. §§ 102(a)¹¹ and 102(b).

Matsumura recites a publication date of August 21, 1991, and Okada 2 recites a publication date of September 23, 1993. Ex. 1006, [43]; Ex. 1010, [43]. Both references identify the publication date using INID code “43.” *Id.* “INID” is an acronym for “Internationally agreed Numbers

¹¹ Patent Owner has not identified a date of invention earlier than September 11, 1997.

for the Identification of (bibliographic) Data” proposed by the World Intellectual Property Organization (WIPO) to aid in the identification of bibliographic data concerning patent documents, such as the date that the document was published. See WIPO HANDBOOK ON INDUSTRIAL PROPERTY INFORMATION AND DOCUMENTATION, Standard ST.9, p. 3.9.0 (available at <http://www.wipo.int/export/sites/www/standards/en/pdf/03-09-01.pdf>). INID code 43 is used to identify the “date of making available to the public by *printing* or similar process of an unexamined patent document, on which no grant has taken place on or before the said date.” *Id.* at 3.9.5 (emphasis added). Other INID codes are used to identify other ways that patent documents are made available to the public. For example, INID codes 41 and 42 are used to identify the date a patent document was made “available to the public by viewing, or copying on request” and INID code 46 is used to identify the date that “the claim(s) only of a patent document” were made available to the public. *Id.*

At this stage of the proceeding, we find that the Japanese Patent Office’s use of INID code 43 to describe the publication dates of Matsumura and Okada 2 as the date that these references were “mad[e] available to the public by printing or similar process,” provides sufficient evidence to conclude that both Matsumura and Okada 2 constitute printed publications under § 102. See Ex. 1006 [43]; Ex. 1010 [43]; *see also Cacace v. Meyer Marketing (Macau Commercial Offshore) Co., Ltd.*, 812 F. Supp. 547, 563 n. 16 (S.D.N.Y. 2011) (finding that Japanese laid open patent applications “are treated as printed publications under United States patent law”). As such, we determine that Petitioner has made a threshold showing that Matsumura and Okada 2 were published more than one year before

September 11, 1997, the filing date of the '650 provisional application to which the '264 patent claims priority, and therefore qualify as prior art printed publications under 35 U.S.C. §§ 102(a) and (b). We similarly find that Edamura, Okada, and Kaji, which have each been characterized by the Japanese Patent Office using INID code 43, have publication dates more than one year before September 11, 1997, and therefore also qualify as prior art printed publications under §§ 102(a) and 102(b). *See* Ex. 1008 [43], Ex. 1004, [43], Ex. 1012 [43].

Patent Owner's reliance on *Ex parte Haller* for the proposition that laid open patent applications are not printed publications is not persuasive, because the specification of the application at issue in *Haller* was not made available to the public by printing, but rather made open to public inspection. Prelim. Resp. 10–11; *see Ex parte Haller*, 103 USPQ 332 (Bd. App. 1953); *see also In re Wyer*, 655 F.2d 221, 226–27 (CCPA 1981) (distinguishing *Ex parte Haller* and affirming the Board's finding that a laid open Australian patent application was a printed publication). Patent Owner's unsupported attorney argument that Matsumura and Okada 2 were "inaccessible" does not overcome the evidence that the references were published as of the date indicated by INID code 43. *See* Prelim. Resp. 11.

D. Level of Ordinary Skill in the Art

Petitioner contends a person of ordinary skill in the art at the time of the alleged invention of the '264 patent would have had familiarity with plasma processing systems and at least a Bachelor of Science degree in electrical engineering and/or physics, or a related field such as, but not limited to, materials science, chemical engineering or mechanical engineering and 4–6 years of experience working in the field of plasma

processing, or a comparable amount of combined education and equivalent experience with respect to plasma processing systems. Pet. 25–26 (citing Ex. 1013 ¶ 39). Petitioner also contends that the level of skill is reflected by the teachings of the prior art, and that a person of ordinary skill in the relevant field would be knowledgeable of heat transfer relationships in systems and processes. *Id.* at 26 (citing Ex. 1013 ¶ 40).

Patent Owner does not propose a different level of ordinary skill in its Preliminary Response. Based on our review of the '264 patent, the types of problems and solutions described in the '264 patent and cited prior art, and the testimony of the parties' declarants, we agree with Petitioner's assessment of the level of ordinary skill in the art.

*E. Asserted Unpatentability of Claim 13 over Kadomura Alone
or in Combination with Matsumura*

Petitioner contends that claim 13 is anticipated under § 102 by Kadomura, and is also unpatentable under § 103 as obvious Kadomura, either alone or in combination with Matsumura. Pet. 26–43. Petitioner relies upon the Kushner Declaration (Ex. 1013) to support its positions. On this record, we are not persuaded that Kadomura, either alone or in combination with Matsumura, discloses or teaches “the thermal mass of the substrate holder is selected for a predetermined temperature change within a specific interval of time during processing” as recited in claim 13.

1. Asserted Anticipation of Claim 13 by Kadomura

*a. Overview of Kadomura*¹²

Kadomura generally relates to “a static electricity chuck [that] can vary the temperature of a wafer in a short time without adversely effecting throughput, and a wafer stage for the static electricity chuck.” Ex. 1002, 2:60–64. The “wafer stage is characterized in that a static electricity chuck, comprising a dielectric member . . . , an electrode . . . , and a heater . . . , are provided on a metal jacket having a cooling means.” *Id.* at 4:22–28. Because the “static electricity chuck . . . is provided on the metal jacket having the cooling means,” not only can “the wafer . . . be quickly heated by the heater provided to the static electricity chuck, but also the wafer can be cooled through the static electricity chuck by the metal jacket.” *Id.* at 4:29–35. Figure 1, shown below, “is a diagram showing the construction of a

¹² A different Kadomura reference (U.S. Patent No. 6,063,710, Ex. 1019) was at issue in IPR2016-01510. *Compare* Ex. 1019 with Ex. 1002.

wafer stage . . . in which only a stack electricity chuck is illustrated as a cross sectional view.” *Id.* at 4:60–62.

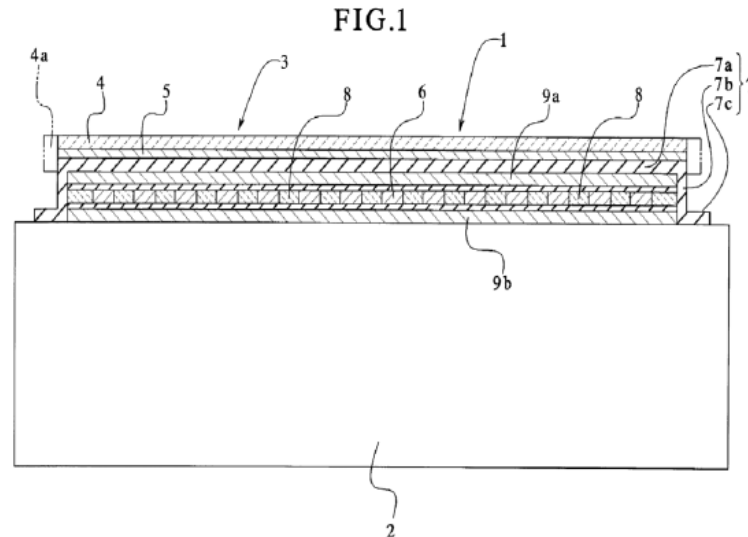


Figure 1 illustrates an embodiment of wafer stage 1 having static electricity chuck 3 mounted on metal jacket 2. *Id.* at 5:6–11. Static electricity chuck 3 comprises dielectric member 4, electrode 5, heater 6, and insulator 7. *Id.* at 5:16–21. Dielectric member 4 is formed of a high thermal conductivity material and has a thickness of about 0.2 mm. *Id.* at 5:21–24. Insulator 7 is also formed of a high thermal conductivity material and has a thickness of about 2 mm. *Id.* at 5:41–50. Heater 6 is sandwiched between metal plates 9a and 9b. *Id.* at 5:67–6:2. Materials “having high thermal conductivity [are] preferably used for . . . metal plates 9a and 9b in order to quickly transfer the heat of heater 6 to . . . dielectric member 4 or quickly transfer the cool heat from . . . metal jacket 2 to . . . heater 6.” *Id.* at 6:2–7. Chiller 25 supplies metal jacket 2 with refrigerant. *Id.* at 7:11–17. Wafer W, fixed on wafer stage 1, is cooled by the circulating refrigerant. *Id.* at 7:17–19, 8:32–35.

In one embodiment, substrate 30, having polysilicon layer 32 and WSi_x layer 33 formed on SiO₂ film layer 31, is subjected to a two-step etching treatment. *Id.* at 7:45–56. In a first step, a main etching is performed at a temperature slightly higher than normal temperature; in a subsequent second step, an over etching is performed at a low temperature. *Id.* at 7:56–60. In the first step, etching is performed at a high temperature of 50° C so that WSi_x layer 33 and polysilicon layer 32 are etched until a part of the polysilicon layer 32 is left. *Id.* at 7:61–67; Fig. 3B. Next, residual gas is exhausted, etching gas is introduced, and gas refrigerant below -100°C is supplied from chiller 25 to metal jacket 2 to quickly cool wafer W. *Id.* at 8:17–35. Because certain components of wafer stage 1 are formed of materials having high thermal conductivity, the wafer stage can be quickly cooled from 50°C to -50°C within about 30 seconds by the quick cooling operation. *See id.* at 8:36–52 (identifying wafer stage components metal plate 9b and insulator 7 as having high thermal conductivity).

After the etching of one wafer is completed, the temperature of the wafer stage must be raised before the etching treatment of a new sample is started. *Id.* at 9:57–60. According to Kadomura, this change in temperature (e.g., -50°C to 50°C) can be performed in 40 seconds by designing wafer stage 1 to have excellent thermal conductivity. *Id.* at 9:57–10:3. “Accordingly, this method can shorten the time required from when the etching treatment on one wafer is finished until the etching treatment on a new sample is started.” *Id.* at 9:56–59.

b. Analysis

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior

art reference.” *Verdegaal Bros. v. Union Oil Co.*, 814 F.2d 628, 631 (Fed.Cir.1987). Petitioner argues that Kadomura discloses all the limitations recited in independent claim 13, either expressly or inherently, including selecting a thermal mass of the substrate holder for the predetermined temperature change and the selected interval of time. Pet. 26–36. Specifically, Petitioner contends that “Kadomura clearly teaches the selection of a thermal mass for the substrate holder in that the substrate holder must at least facilitate or allow . . . the predetermined temperature change within a specific time interval, so that rapid heat transfer and rapid heating or cooling can be achieved.” *Id.* at 36 (citing Ex. 1001, 2:52–57, Ex. 1013 ¶¶ 137–149).

Patent Owner responds that even if Kadomura teaches selecting the thermal mass of the substrate, Kadomura “does not teach selecting [the thermal mass] ‘for’ a predetermined temperature change within a specific interval of time.” Prelim. Resp. 6.

We agree with Patent Owner that Petitioner has not persuasively demonstrated that Kadomura discloses selecting the thermal mass of the substrate holder for a predetermined temperature change within a specific interval of time during processing as required by claim 13, either expressly or inherently. Even if we agree with Petitioner’s arguments that Kadomura discloses a “predetermined temperature change within a specific interval of time during processing,” Petitioner has not shown that the selection of the thermal mass of the substrate holder is based on the predetermined

temperature change within a specific interval of time as required by claim 13.

As discussed above, claim 13 requires predetermining the temperature change within a specific interval of time and based on that determination, selecting the thermal mass. Petitioner argues that Kadomura teaches this limitation “in several ways.” Pet. 35. For example, Petitioner argues that “Kadomura teaches designing the wafer stage and selecting the materials of the wafer stage to have a high thermal conductivity in the same sentence and interrelated with the predetermined temperature change in a selected interval of time.” *Id.* Petitioner also argues that Kadomura discloses selecting materials of the wafer stage overall or its particular elements “for rapid heat transfer or high thermal conductivity.” *Id.* at 35–36. Petitioner, however, does not adequately explain how selecting the *thermal conductivity* of the substrate holder for a predetermined temperature change discloses, either expressly or inherently, selecting the *thermal mass* of the substrate holder for a predetermined temperature change within a specific interval. As noted by Dr. Kushner, the “thermal mass of an object such as the substrate holder is the ability of the object to *store* thermal energy.” Ex. 1013 ¶ 67. In contrast, thermal conductivity is a measure of a material’s ability to *conduct* heat. *Id.* ¶ 69; *see also id.* ¶ 67 (stating thermal mass is represented by C_{th} or M_T and is measured in units such as Joules/degrees Celsius), ¶ 68 (stating thermal mass of an object is determined by mass density of the object, the specific heat capacity of the material of the object, and the volume of the object). Thus, even if Kadomura discloses selecting the *thermal conductivity* of the substrate holder for a predetermined temperature change within a specific interval of time during processing, Petitioner has not persuasively

shown that this constitutes a disclosure of selecting the thermal *mass* of the substrate holder for a specific interval of time during processing.

Petitioner also argues that Kadomura inherently teaches the limitations of claim 13 because the thermal mass of Kadomura's substrate holder "must *allow* or *facilitate* the predetermined temperature change in the preselected amount of time" otherwise Kadomura would not operate as described. Pet. 36–37 (emphasis altered). This argument is not persuasive. Method claim 13 requires selecting the thermal mass based on the predetermined temperature change within the specific interval of time. Even if the selected thermal mass would inherently result in the predetermined temperature change within the specific interval of time, Petitioner has not persuasively explained that selection of a thermal mass *was based* on the preselected temperature within the specific interval of time. See Ex. 3002 ("Although such a thermal mass [based on a predetermined temperature change and specified interval of time processing] may be inherent, there is no teaching to *predetermine a temperature change and interval of time, and based on that, to select the thermal mass of the substrate holder.*") (emphasis added).

2. Kadomura and Matsumura

Petitioner also relies upon the teachings of Matsumura to show that claim 13 is (1) inherently anticipated by Kadomura or (2) unpatentable as obvious over Kadomura and Matsumura. Pet. 37–44.

*a. Matsumura*¹³

Matsumura is directed to a “Heat Treatment Device” that measures “heat flux” in order to control temperature changes in a resist baking process. Ex. 1006 ¶ 39. Matsumura states that “when a temperature of a subject [e.g., wafer] to be treated is increased to a predetermined temperature or decreased to a predetermined temperature . . . a precise control with a good responsiveness is difficult.” *Id.* ¶¶ 4, 37. Because there is a “predetermined correlation between the heat flux and the temperature [of the substrate], a change in temperature can be predicted by monitoring the heat flux.” *Id.* ¶ 16, *see also id.* ¶ 6 (noting that “as a change in phenomenon, a heat flux tend to be detected earlier than a temperature”).

Matsumura states “the present invention is configured to detect a heat flux from a heating means flowing through a subject to be treated using a heat flux sensor and then to predict and control a temperature based on the heat flux.” Ex. 1006 ¶ 41, *see also id.* ¶ 33 (stating “by detecting heat flux flowing through the wafer . . . , it is possible to precisely control the temperature increasing period and the temperature decreasing period in the baking treatment”).

Matsumura discloses “thermal diffusion equation (3)” which shows that “a predetermined correlation exists between the heat flux and the temperature.” *Id.* ¶ 5.

¹³ A different Matsumura reference (US Patent No. 5,151,871, Ex. 1020) was at issue in IPR2016-01510 and IPR2017-00279. *Compare* Ex. 1020 with Exs. 1005, 1006.

$$\frac{\partial T}{\partial t} = \frac{k}{\rho C_p} \cdot \frac{\partial^2 T}{\partial y^2} \quad \dots (1)$$

$$q = k \frac{\partial T}{\partial y} \quad \dots (2)$$

$$\frac{\partial T}{\partial t} = \frac{1}{\rho C_p} \cdot \frac{\partial q}{\partial y} \quad \dots (3)$$

where dT/dt represents the rate of temperature change (where T is temperature and t is time), q =heat flux, y =coordinate, p =density, C_p =thermal capacity, and k =thermal conductivity. *Id.*

Matsumura teaches that “heat flux is calorie per unit area and unit time; the unit is kcal/m²h).” *Id.* In “general, a temperature is an integral value of a heat flux with respect to time and coordinate” as shown in thermal diffusion equation (1) and Fourier’s law equation (2). “Accordingly, when a heat flux is determined, temperatures of the heating plate and the subject to be treated are determined as a result thereof.” *Id.*

b. Analysis

Normally, an anticipation argument under § 102 is based on a single reference. However, § 102 rejections involving more than one reference have been held proper when the extra reference is cited to provide evidence that a characteristic not disclosed in the reference is inherent. *See Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991) (stating that to “serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence”).

Even if a claim is not anticipated by §102, a claim may still be unpatentable under § 103 “if the differences between the claimed invention and the prior art are such that the invention as a whole would have been

obvious to one of ordinary skill in the art at the time the invention was made. *Atlas Powder Co. v. E.I. du Pont De Nemours & Co.*, 750 F.2d 1569, 1574 (Fed. Cir. 1984); *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Petitioner contends that to the extent Kadomura does not explicitly disclose selecting the thermal mass as required by claim 13, Matsumura remedies this deficiency. Pet. 37–40. Petitioner argues that Matsumura “reinforces and provides evidence that the selected thermal mass and the interrelationship with temperature and time would necessarily be present to achieve a desired temperature change rate.” *Id.* at 40 (citing Ex. 1013 ¶¶ 153–160). Specifically, Petitioner argues that Matsumura discloses known “heat flux, time, temperature, and thermal diffusion relationships that would be associated with heating a substrate holder . . . and a wafer thereon.” *Id.* at 37. Petitioner contends that Matsumura’s thermal diffusion equation (3) demonstrates that “the materials selected in Kadomura would necessarily have to facilitate or allow the desired temperature change in the selected amount of time.” *Id.* at 38–39. Petitioner further contends that “if the properties of the material selected are such that the denominator (pc_p) is too high, the desired temperature change rate would not be achieved.” *Id.* at 38.

We do not find that Matsumura remedies the deficiencies of Kadomura. Matsumura teaches that there is a relationship between change

in temperature over time and thermal mass. However, a teaching that the thermal mass of an object is one of the factors that can impact the rate at which the object changes temperature does not teach, or render inherent, selecting the mass of a substrate holder based on a predetermined temperature change within a specific interval of time.

As we noted in our Decision Denying Institution in IPR2016-01510, a teaching that the thermal mass *impacts* the rate at which the object changes temperature “tells us little, if anything, about selecting the mass of a substrate holder in order to ensure that the substrate holder changes a specific temperature over a discrete period of time.” Ex. 1018, 19–20. We further noted that “merely demonstrating that a chuck with low thermal mass has the ability to change temperatures rapidly is no more a specific teaching of the limitation at issue than demonstrating that a chuck with high thermal mass is less conducive to rapid temperature changes.” *Id.* at 20. “In other words, although [the asserted references] both demonstrate that there is a mathematical relationship between thermal mass and the rate of temperature change, these references do not disclose that it was known to select a substrate holder having a particular thermal mass based on this mathematical relationship.” *Id.*

Petitioner also argues that “the substrate holder having a selected thermal mass” where “the thermal mass of the substrate holder is selected for a predetermined temperature change within a specific interval of time during processing” would have been obvious to one of ordinary skill in the art. Ex. 1013 ¶ 162. Dr. Kushner states that it would have been obvious to one of ordinary skill in the art that “merely selecting the material or thickness of the substrate holder constitutes selecting a thermal mass,

selecting the mass of the substrate holder, the material of the substrate holder, or both.” Ex. 1013 ¶ 163. Petitioner contends that it would have been obvious to one skilled in the art to select the material and/or mass for the substrate holder that would allow or facilitate the desired temperature change in the selected amount of time. *Id.* ¶ 164. Petitioner’s argument is not persuasive for the reasons discussed in the prior section, because it focuses on selecting a thermal mass that may “allow or facilitate” a temperature change, but does not address the requirement that the selection of the thermal mass be based on the predetermined temperature change over a specified time.

As we have found that Kadomura, either alone or in combination with Matsumura, fails to disclose or suggest that the *thermal mass of the substrate holder is selected for a predetermined temperature change within a specific interval of time during processing*, we are unpersuaded that the record sufficiently establishes that Petitioner would prevail in demonstrating the unpatentability of claim 13 over Kadomura or over Kadomura and Matsumura.

F. Asserted Unpatentability of Claim 13 over Okada

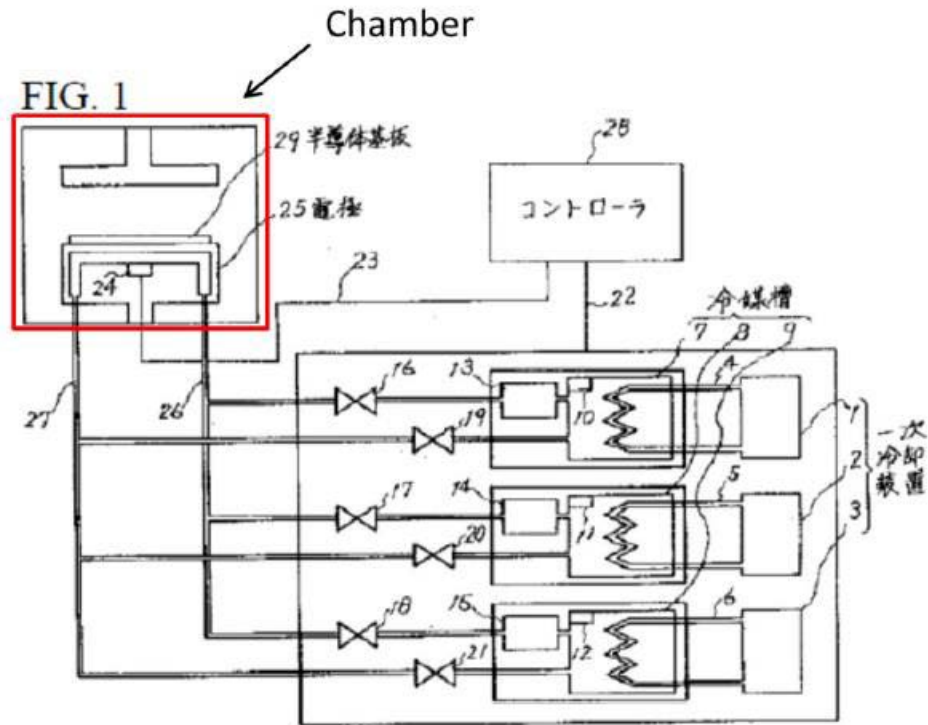
Petitioner contends that claim 13 is anticipated by Okada, and is unpatentable as obvious over the combined teachings of Okada, Matsumura, and/or Kadomura. Pet. 44–53. Relying on the Kushner Declaration, Petitioner explains how the cited art purportedly discloses or suggests the limitations of claim 13. *Id.* On this record, we are not persuaded that Okada, either alone or in combination with Matsumura and/or Kadomura, discloses “the thermal mass of the substrate holder is selected for a

predetermined temperature change within a specific interval of time during processing,” as recited in claim 13.

1. *Okada*¹⁴

Okada generally relates to a semiconductor controlling device and, in particular, to a temperature controlling system that controls the temperature of an electrode on which a substrate is placed in a dry etching apparatus. Ex. 1004 ¶ 1. According to Okada, conventional apparatuses include a temperature controlling system for a single stage cooling device. *Id.* ¶ 5. When changing the temperature of an electrode contained therein during each individual etching step, the responsiveness of the single stage cooling device is poor. *Id.* ¶ 6. The invention disclosed in Okada addresses this problem associated with conventional apparatuses by providing a dry etching apparatus with adequate responsiveness in temperature control of an electrode. *Id.* ¶ 7. An annotated version of Figure 1 of Okada, reproduced below, illustrates a structural diagram of one embodiment of the disclosed invention. *Id.* ¶ 10.

¹⁴ Okada was also asserted in IPR2016-01510, in which Petitioner Samsung argued, *inter alia*, claim 13 was unpatentable over Okada in combination with two other references. Ex. 1018, 8. There, we found that Petitioner had not shown that the cited art taught the limitation of claim 13 requiring that “the thermal mass of the substrate holder is selected for a predetermined temperature within a specific interval of time during processing.” *Id.* at 19–20.



As shown in Figure 1 above, a vacuum process chamber (outlined in red) includes electrode 25 on which semiconductor 29 is placed. *Id.* ¶ 11.

Coolant tanks 7, 8, and 9, which are controlled using single stage cooling devices 1, 2, and 3, respectively, each are capable of supplying coolant to electrode 25. *Id.* For instance, when setting electrode 25 to temperature A, valves 16 and 19 are opened so that coolant from tank 7, which maintains temperature A, is fed to the electrode by pump 13. *Id.* ¶ 15. When setting electrode 25 to temperature B, valves 16 and 19 are closed simultaneously before valves 17 and 20 are opened so that coolant from tank 8, which maintains temperature B, is fed to the electrode by pump 14. *Id.* ¶ 16.

According to Okada, the time required for electrode 25 to change from temperature A to B is between two and ten seconds. *Id.*

2. Analysis

Petitioner argues that Okada is a “more relevant primary reference” than Kadomura if the claims are “interpreted to require an arrangement in which the temperature of the substrate holder is changed by changing the temperature of a heat transfer fluid passing through the substrate holder.” Pet. 11. As discussed supra, we do not construe independent claim 13 as requiring the involvement of the heat transfer fluid.

Petitioner acknowledges that Okada does not expressly teach selecting the thermal mass of the substrate holder. Pet. 45. However, Petitioner argues that Okada inherently selects the thermal mass of the substrate holder because “the substrate holder of Okada would *necessarily* have to have a thermal mass selected to facilitate or allow the predetermined temperature change within the specified interval of time. Otherwise, Okada would not operate as disclosed.” *Id.* at 49 (citing Ex. 1013 ¶¶ 196–199) (emphasis altered). In support of this argument, Petitioner again cites to Matsumura’s teaching that achieving a desired temperature rate range dT/dt depends on the thermal mass, asserting that “[i]f the selected thermal mass (in the selection of the material, mass, or both) is too high, it would block achievement of the dT/dt required to achieve Okada’s predetermined temperature change in Okada’s specified time interval.” *Id.* (citing Ex. 1013 ¶ 199); *see also id.* at 50 (stating the selection of a thermal mass to achieve Okada’s temperature change rate is the natural result flowing from the explicit disclosure of Okada).

These arguments are not persuasive. As discussed above, Matsumura teaches that there is a relationship between change in temperature over time and thermal mass. However, a teaching that the thermal mass of an object is

one of the factors that can impact the rate at which the object changes temperature does not teach, or render inherent, selecting the mass of a substrate holder based on a predetermined temperature change within a specific interval of time.

As we noted in IPR2016-01510, a teaching that the thermal mass *impacts* the rate at which the object changes temperature “tells us little, if anything, about selecting the mass of a substrate holder in order to ensure that the substrate holder changes a specific temperature over a discrete period of time.” Ex. 1018, 19–20. We further noted that “merely demonstrating that a chuck with low thermal mass has the ability to change temperatures rapidly is no more a specific teaching of the limitation at issue than demonstrating that a chuck with high thermal mass is less conducive to rapid temperature changes.” *Id.* at 20. “In other words, although [the asserted references] both demonstrate that there is a mathematical relationship between thermal mass and the rate of temperature change, these references do not disclose that it was known to select a substrate holder having a particular thermal mass based on this mathematical relationship.” *Id.*

Petitioner further argues that the selection of a thermal mass in Okada to facilitate or allow the predetermined temperature change within the selected interval of time also would have been obvious because one skilled in the art would have recognized that the selection of material, mass, or both, would facilitate the attainment of Okada’s predetermined temperature change within the selected interval of time.” Pet. 50 (citing Ex. 1013 ¶¶ 162–172, 201). This argument is unpersuasive for the reasons stated above.

Petitioner's arguments as to why claim 13 would have been obvious over the combination of Okada, Matsumura, and Kadomura, are essentially the same as the arguments made with respect to the combination of Kadomura and Matsumura discussed above. That is, Petitioner argues that, if Okada does not teach the selection of a thermal mass to facilitate or allow the predetermined temperature change within the selected interval of time, Kadomura and Matsumura provide this teaching. Pet. 50–53. As noted above, however, the combination of Kadomura and Matsumura does not teach or suggest this limitation. Therefore, Petitioner has not persuasively shown that the combination of Okada, Kadomura, and Matsumura teaches or suggests that the thermal mass of the substrate holder is selected for a predetermined temperature change as required by claim 13. As such, Petitioner has not shown a reasonable likelihood that claim 13 is unpatentable over Okada, either alone or in combination with Kadomura and Matsumura.

G. Remaining Grounds of Unpatentability

Petitioner also contends that dependent claims 14–26, 64, and 65 are unpatentable under § 103(a) over various asserted combinations of prior art references. See Pet. 53–69. By virtue of their dependency, these claims include the same limitations as independent claim 13. None of these asserted obviousness grounds rely on any disclosures other than Kadomura, Matsumura, and Okada to meet the selected thermal mass limitations of claim 13. We are not persuaded that any of the additional references remedy the deficiencies discussed above. Consequently, Petitioner has not demonstrated a reasonable likelihood that it will prevail on its assertion that

dependent claims 14–26, 64, and 65 would have been obvious over the various asserted prior art references

III. CONCLUSION

Taking into account the arguments presented in the Petition and the Preliminary Response and the evidence of record, we conclude that the information presented in the Petition does not establish that there is a reasonable likelihood that Petitioner will prevail in challenging any of claims 13–26, 64, and 65 of the '264 patent.

IV. ORDER

Accordingly, it is:

ORDERED that the Petition is DENIED and no trial is instituted.

IPR2017-01072
Patent RE40,264 E

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