

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CANADIAN SOLAR INC. and
CANADIAN SOLAR (USA) INC.,
Petitioner,

v.

THE SOLARIA CORPORATION,
Patent Owner.

IPR2021-00095
Patent 10,522,707 B2

Before TERRENCE W. McMILLIN, JON M. JURGOVAN, and
MONICA S. ULLAGADDI, *Administrative Patent Judges*.

McMILLIN, *Administrative Patent Judge*.

DECISION

Granting Petitioner's Request on Rehearing
37 C.F.R. § 42.71(d)
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Canadian Solar Inc. and Canadian Solar (USA) Inc. (“Petitioner”)¹ filed a Petition to institute an *inter partes* review of claims 1, 2, 6, 8–10, and 12–20 (the “challenged claims”) of U.S. Patent No. 10,522,707 B2 (Ex. 1001, the “’707 patent”) pursuant to 35 U.S.C. § 311 *et seq.* Paper 1 (“Petition” or “Pet.”). The Solaria Corporation (“Patent Owner”)² filed a Preliminary Response. Paper 7 (“Preliminary Response” or “Prelim. Resp.”). With our authorization, Petitioner thereafter filed a Reply (Paper 9 (“Reply”)) and Patent Owner filed a Sur-reply (Paper 10 (“Sur-reply”)). The Preliminary Response, Reply, and Sur-reply addressed only the issue of discretionary denial of institution. On May 26, 2021, we entered a Decision Denying Institution in which we exercised our discretion to deny institution under 35 U.S.C. § 314(a) because the ’707 patent was the subject of a parallel proceeding. (Paper 12 (“Decision Denying Institution” or “DDI”)).

Petitioner filed a timely Request for Rehearing. (Paper 14 (“Request for Rehearing” or “Request”)). In its Request for Rehearing, Petitioner asks that we reconsider our Decision Denying Institution because Patent Owner moved to drop the ’707 patent from the parallel proceeding. Request 1–2. After considering the Request for Rehearing and for the reasons set forth below, we institute an *inter partes* review as to all of the challenged claims of the ’707 patent on the grounds of unpatentability presented in the Petition. We determine that the information presented in the Petition shows that “there is a reasonable likelihood that the petitioner would prevail with

¹ Petitioner identifies Canadian Solar Inc. and Canadian Solar (USA) Inc. as the real parties-in-interest to this proceeding. Pet. 2.

² Patent Owner identifies The Solaria Corporation as the real party-in-interest. Paper 6, 2.

respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a) (2018).

A. Related Proceedings

The parties identify the following related proceedings:

Certain Shingled Solar Modules, Components Thereof, and Methods for Manufacturing the Same, Inv. No. 337-TA-1223 (US International Trade Commission) (the “ITC investigation”); and

The Solaria Corporation v. Canadian Solar Inc., Case No. 4:20-cv-02169 (N.D. Cal.) (the “District Court litigation”). Pet. 2–3; Paper 6, 2.

B. The '707 Patent

The '707 patent is titled “Tiled Solar Cell Laser Process.” Ex. 1001, code (54). The patent is “directed to photovoltaic systems and manufacturing processes and apparatuses thereof.” *Id.* at 1:13–14. The patent describes that “[c]onventionally, solar cells are mechanically cut with a saw. However, this technique has numerous disadvantages.” *Id.* at 2:19–20.

The '707 patent describes providing “a solar cell comprising either a single crystalline silicon material or a polycrystalline solar cell, the solar cell having a backside and a front side and a thickness, the backside having a metal material,” and placing “the front side of the solar cell on a platen such that the backside is facing a laser source.” *Id.* at 2:37–53. The laser source is then “initiated” “to output a laser beam having a wavelength from 200 to 600 nanometers and a spot size of 18 to 30 microns,” thus “subjecting a portion of the backside to the laser beam at a power level ranging from about 20 Watts to about 35 Watts to cause an ablation to form a scribe region having a depth, width, and a length.” *Id.* The scribe region is then cut to a

“depth being from 40% to 60% of a thickness of the solar cell, the width being between 16 and 35 microns, and the length being equivalent to a length of the solar cell.” *Id.* The patent also discloses “delivering a jet of fluid within a vicinity of the ablation to carry away particulate material, and capturing the particulate material using a vacuum.” *Id.* at 3:10–13.

Figure 29, reproduced below, shows an isometric view of a scribe region of a solar cell.

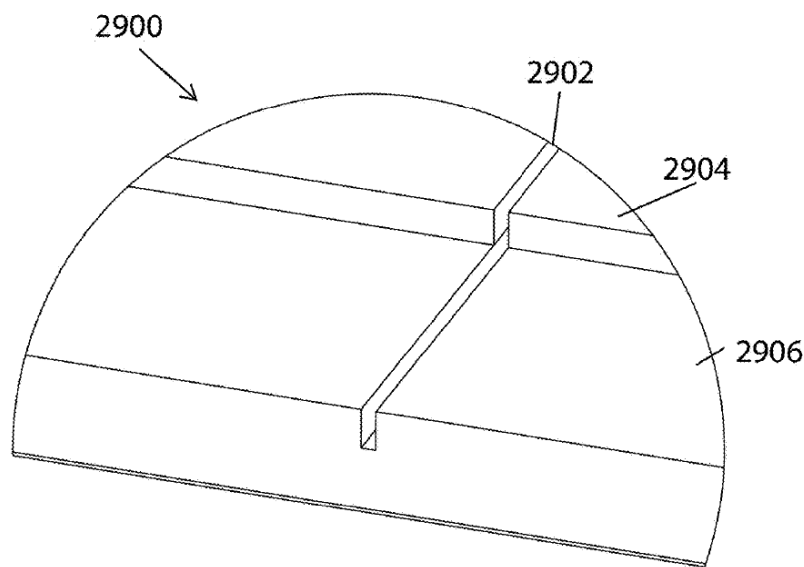


Figure 29 depicts scribe region 2900, kerf 2902, backing material 2904, and photovoltaic material 2906. *Id.* at 8:10–15.

C. Challenged Claims

Petitioner challenges claims 1, 2, 6, 8–10, and 12–20 of the '707 patent. Pet. 1. Claim 1, the sole independent claim, is reproduced below.

1. A method comprising:
 - providing a solar cell comprising either a single crystalline silicon material or a polycrystalline solar cell, the solar cell having a backside and a front side and a thickness, the backside having a metal material;
 - placing the front side of the solar cell on a platen such that the backside is facing a laser source;

initiating a laser source to output a laser beam;
subjecting a portion of the backside to the laser beam to cause an ablation to form a scribe region having a depth, width, and a length, the depth being from 40% to 60% of the thickness of the solar cell, and the length being equivalent to a length of the solar cell;
removing a vaporized material from a vicinity of the ablation;
and
capturing the vaporized material using a vacuum.

D. The Asserted Grounds

Petitioner challenges claims 1, 2, 6, 8–10, and 12–20 of the '707 patent based on the grounds set forth in the table below.

Claim(s) Challenged	35 U.S.C. §	References
1, 2, 6, 8, 9, 12–16	103	Jinno ^{3,4} , Suutarinen ⁵
10	103	Jinno, Suutarinen, Liu ⁶
13	103	Jinno, Suutarinen, Morad ⁷
17, 18	103	Jinno, Suutarinen, Spectra-Physics ⁸

³ JP 2008-60205 A, published Mar. 13, 2008 (Ex. 1005). Petitioner contends this reference is prior art under 35 U.S.C. § 102(a). Pet. 15.

⁴ Petitioner refers to this reference as “Jinno-205,” to distinguish it from Jinno '604.

⁵ US 2008/0067160 A1, published Mar. 20, 2008 (Ex. 1006). Petitioner contends this reference is prior art under 35 U.S.C. § 102(a). Pet. 17.

⁶ US 6,580,054 B1, issued June 17, 2003 (Ex. 1028). Petitioner contends this reference is prior art under 35 U.S.C. § 102. Pet. 54.

⁷ US 2015/0349167 A1, published Dec. 3, 2015 (Ex. 1048). Petitioner contends this reference is prior art under 35 U.S.C. § 102. Pet. 59 n.4.

⁸ “Laser Edge Isolation Scribing for Crystalline Silicon Solar Cell Production,” published Oct. 25, 2012 (retrieved from https://web.archive.org/web/20121025174411/http://assets.newport.com/webDocuments-EN/images/Laser_Edge_Isolation_Scribing_SP.pdf) (Ex. 1011). Petitioner contends this reference is prior art under 35 U.S.C. § 102. Pet. 67.

Claim(s) Challenged	35 U.S.C. §	References
19	103	Jinno, Suutarinen, Shamoun ⁹
20	103	Jinno, Suutarinen, Shamoun, Daly ¹⁰

Petitioner also relies on the Declaration of Dr. Stephen P. Shea (Ex. 1003, “Shea Decl.”), which provides evidence in support of the contentions in the Petition. At this stage, Patent Owner has not submitted a declaration or other testimonial evidence of an expert and has not argued that any of the cited references do not qualify as prior art. *See generally* Prelim. Resp.

II. ANALYSIS

A. *Discretionary Denial of Institution and Request for Rehearing*

Institution of *inter partes* review is discretionary. *See Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) (“[T]he PTO is permitted, but never compelled, to institute an IPR proceeding.”); 35 U.S.C. § 314(a) (2018). The Board has held that the advanced state of a parallel proceeding is a factor that may weigh in favor of denying a petition under § 314(a). *See NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 20 (PTAB Sept. 12, 2018) (precedential); Patent Trial and Appeal Board, Consolidated Trial Practice Guide, 58 & n.2 (Nov. 2019) (available at <https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf>). In its Preliminary Response, Patent Owner contended we should exercise our discretion to deny the Petition under § 314(a), “because the invalidity arguments [Petitioner] raises here will be resolved in a pending ITC Investigation before this proceeding will conclude.” Prelim. Resp. 1. We

⁹ US 2010/0155379 A1, published June 24, 2010 (Ex. 1017). Petitioner contends this reference is prior art under 35 U.S.C. § 102. Pet. 71.

¹⁰ US 3,626,141, issued Dec. 7, 1971 (Ex. 1030). Petitioner contends this reference is prior art under 35 U.S.C. § 102. Pet. 73.

evaluated the factors set forth in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential), and determined that discretionary denial was appropriate in view of the ITC investigation involving the '707 patent. *See generally* DDI. Specifically, we determined that “[t]he fact that there is not a likelihood of a stay in the ITC investigation, the ITC investigation is scheduled to be completed substantially before our final written decision, and the high level of investment in the ITC investigation outweigh the facts that support declining to exercise discretion.” DDI 15.

In the Request for Rehearing, Petitioner “submit[s] that the Board misapprehended the nature and fragility of Patent Owner’s assertion of the ’707 Patent in the ITC Investigation and the corresponding likelihood that the ITC Investigation would yield a final invalidity determination before a final written decision is this proceeding, and further that the facts as they stand today do not support the Board’s Decision.” Request 2. We do not agree that the Board misapprehended anything. Our Decision Denying Institution was appropriate under the facts as they existed at the time. We do agree that the facts as they stand today do not support our Decision Denying Institution and, in light of the changed facts, we modify our earlier decision that exercised our discretion to deny institution.

The parallel proceeding that served as our basis for exercising our discretion to deny institution no longer involves the ’707 patent. On June 28, 2021, the ITC Investigation was terminated with respect to the ’707 patent. Ex. 1063, 2. Petitioner argues that, “Patent Owner’s decision to terminate the ’707 Patent from the ITC Investigation eliminates the factual basis for the Board’s denial of institution.” Request 4. We agree. In

weighing the *Fintiv* factors, we relied on the involvement of the '707 patent in an ITC investigation as the basis for our weighing 4 of 6 factors and for our holistic assessment of the factors in favor of our exercising our discretion to deny institution. DDI 9 (factor 1), 10 (factor 2), 11 (factor 3), 14 (factor 5), 15 (holistic assessment). However, the ITC investigation no longer provides any basis for exercising our discretion to deny institution.¹¹

We possess the inherent authority to reconsider our Decision Denying Institution. *See GTNX, Inc. v. INTTRA, Inc.*, 789 F.3d 1309, 1313 (Fed. Cir. 2015). In light of the termination of the ITC investigation with respect to the '707 patent, we no longer exercise our discretion to deny institution.

B. Legal Standards

A patent claim is unpatentable as obvious if the differences between the claimed subject matter and the prior art are such that the subject matter,

¹¹ As referenced above, the '707 patent is the subject of another parallel proceeding, the District Court litigation. We considered the District Court litigation in our Decision Denying Institution but did not rely on the District Court litigation in exercising our discretion to deny institution. *See generally* DDI. In its Preliminary Response, Patent Owner argued that the District Court litigation should not be considered when analyzing the *Fintiv* factors. Prelim. Resp. 5 (“Because the District Court Case is behind the [ITC] Investigation, [Patent Owner] submits that the [ITC] investigation should be analyzed when assessing whether the *Fintiv* factors warrant denying institution.”). The '707 patent is still being asserted in the District Court litigation. Request 2. Petitioner argues that consideration of the District Court litigation weighs in favor of institution for the reasons stated in our Decision Denying Institution. *Id.* at 9–10. We agree and determine that the District Court litigation (still) does not support the exercise of our discretion to deny institution for the reasons previously stated, including that there is no indication on the record that there has yet been significant investment in the litigation or that a trial date has been set by the court. DDI 8–15.

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. *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 non-obviousness.¹² *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). Petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

C. Claim Construction

Claim construction in this proceeding is governed by 37 C.F.R. § 42.100 (b), which provides:

In an *inter partes* review proceeding, a claim of a patent, or a claim proposed in a motion to amend under §42.121, shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.

¹² In its Preliminary Response, Patent Owner does not present objective evidence of non-obviousness. *See generally* Prelim. Resp.

Under the standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–19 (Fed. Cir. 2005) (en banc), claim terms are given their ordinary and customary meaning, as would have been understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history of record. *See Thorner v. Sony Comput. Ent. Am. LLC*, 669 F.3d 1362, 1365–66 (Fed. Cir. 2012). There is a “heavy presumption,” however, that a claim term carries its ordinary and customary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002) (citation omitted).

We are also guided by the principle that we only construe claim terms if, and to the extent that, it is necessary for the purpose of the proceeding. *See, e.g., Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (“[C]laim terms need only be construed ‘to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

The Petition states, “Petitioners do not presently believe construction of any terms is necessary to resolve the issues presented in this Petition.” Pet. 13. The Patent Owner does not address claim construction. *See generally* Prelim. Resp. In this Decision, we give the claim terms their ordinary and customary meanings.

D. Level of Ordinary Skill in the Art

With regard to the level of ordinary skill in the art, Petitioner contends:

A person of ordinary skill in the art at the time of filing of the 707 Patent or any of its related applications (“Skilled Artisan”) would have had a bachelor’s degree in any engineering or science field that addresses the design and fabrication of

semiconductors (a category that includes solar cells), plus three years of work experience in that field or equivalent academic experience. A Skilled Artisan would, for example, have been familiar with a variety of common semiconductor singulation processes, including sawing, laser cutting, and laser scribing.

Pet. 5. (citing Ex. 1003 ¶¶ 39–40). Patent Owner does not address the level of ordinary skill in the art. *See generally* Prelim. Resp.

Petitioner’s proposal is consistent with the technology described in the Specification and the cited prior art. In order to determine whether Petitioner has demonstrated a reasonable likelihood of showing the unpatentability of at least one of the challenged claims, we adopt Petitioner’s proposed level of skill in the art.

E. Cited References

1. Jinno (Ex. 1005)

Jinno, an unexamined Japanese patent application publication, is titled “Solar Cell and Production Method Therefor.” Ex. 1005, code (54).¹³ Jinno “relates to a solar cell obtained by cleaving a large-area solar cell along a dividing groove and a method for producing this solar cell.” *Id.* ¶ 1. “A solar cell module is produced by dividing a large-area solar cell consisting of a semiconductor substrate into small-area solar cells, and connecting the small-area solar cells using, for example, lead wires.” *Id.* ¶ 2. “In the method disclosed . . . a dividing groove is formed in a solar cell using a laser or dicing saw, and a solar cell is produced by cleaving the semiconductor substrate using this dividing groove.” *Id.* ¶ 3. Jinno teaches a groove, made

¹³ Here and elsewhere, we cite the certified English translation of Jinno, Exhibit 1005, 2–18.

with an “energy beam,” to a depth of 35% to 65% of the thickness of the solar cell, with the preferred depth of 35% to 50% of the thickness. *Id.* ¶ 7.

2. *Suutarinen (Ex. 1006)*

Suutarinen is titled “Systems and Methods for Laser Cutting of Materials.” Ex. 1006, code (54). Suutarinen relates to “laser cutting systems for cutting materials in a vacuum environment,” “laser singulation of semiconductor wafers,” and “depaneling or singulation of printed circuit boards.” *Id.* ¶ 2.

3. *Liu (Ex. 1028)*

Liu is titled “Scribing Sapphire Substrates With a Solid State UV Laser.” Ex. 1028, code (54). Liu is directed to “scribing sapphire substrates using solid state UV lasers, and separating the scribed sapphire substrate into die.” *Id.* at 1:14–16. One function of Liu’s system is that a “groove is cut, preferably about 40 microns deep, and more preferably greater than about ½ thickness of the sapphire substrate.” *Id.* at 5:18–20. “It is found that the quality of the groove being formed is more V-shaped with parallel polarization, and more U-shaped with polarization that is not aligned. V-shaped grooves are preferred for more uniform and predictable breaking of the substrate during separation of the die.” *Id.* at 3:23–28.

4. *Morad (Ex. 1048)*

Morad is titled “Shingled Solar Cell Module.” Ex. 1048, code (54). Morad is directed to “to solar cell modules in which the solar cells are arranged in a shingled manner.” *Id.* ¶ 2. Morad describes a standard dimension silicon wafer as being 156 mm by 156 mm. *Id.* ¶ 101.

5. *Spectra-Physics (Ex. 1011)*

Spectra-Physics describes a 532 nm laser for scribing solar cells. Ex. 1011, 3. The brochure states that the laser has “excellent power and performance at 120 kHz pulse repetition frequency and beyond.” *Id.* Spectra-Physics further explains, the “shorter pulse widths coupled with low energy / high rep[etition] rate laser output provides very clean and effective isolation scribes.” *Id.*; *see also* Ex. 1003 ¶ 189.

6. *Shamoun (Ex. 1017)*

Shamoun is titled “Illumination Methods and Systems for Laser Scribe Detection and Alignment in Thin Film Solar Cell Fabrication.” Ex. 1017, code (54). Shamoun is directed to “feature detection using combined illumination . . . to detect lines scribed in multi-layered substrates used in thin-film multijunction solarcells.” *Id.* ¶ 5. Shamoun describes using lasers to “ablate or otherwise scribe” “semiconductor wafers,” and “substrate thickness sensors 306 useful in adjusting heights in the system to maintain proper separation from the substrate due to variations between substrates and/or in a single Substrate.” *Id.* ¶¶ 41, 42.

7. *Daly (Ex. 1030)*

Daly is titled “Laser Scribing Apparatus.” Ex. 1030, code (54). Daly is directed to scribing semiconductor wafers. *Id.* at 1:2–4. Daly describes prior art methods to cut wafers includes scoring and snapping, or sawing, but that these methods may damage the wafer being cut. *Id.* at 1:20–43. Daly describes laser cutting wafers by maintaining “a tolerance on the order of 0.1 mils.” *Id.* at 4:50–58.

F. Obviousness Analysis

We determine that Petitioner has shown a reasonable likelihood of establishing the obviousness of claim 1¹⁴ and, on that basis, institute *inter partes* review of all the challenged claims. See 37 C.F.R. § 42.108(a) (“When instituting *inter partes* review, the Board will authorize the review to proceed on all the challenged claims.”).

1. Claim 1

Petitioner presents a detailed analysis of the obviousness of claim 1 supported by citations to the asserted art, the Declaration of Stephen P. Shea, Ph.D. (Ex. 1003 (“Shea Decl.”)), and other evidence. See Pet. 26–48. Our element-by-element consideration of whether Petitioner has shown a reasonable likelihood of establishing the obviousness of claim 1 is provided below.¹⁵

A method comprising:

Although recognizing that the preamble is not limiting, Petitioner cites Jinno as teaching a method. Pet. 26. Jinno is titled, “Solar Cell and Production Method Therefor” and the Abstract states, “[t]o provide a solar cell with excellent cell characteristics that can be produced with a high yield and a method for producing this solar cell.” Ex. 1005, 2 (codes (54), (57)). Claim 4 of Jinno is directed to “[a] method for producing a solar cell.” *Id.* at 4.

¹⁴ Patent Owner’s Preliminary Response and Sur-reply are limited to arguing that institution should be denied under 35 U.S.C. § 314(a). As such, at this stage, we do not have any arguments or evidence submitted by Patent Owner to consider as to the obviousness of claim 1 (or any other challenged claim).

¹⁵ We adopt Petitioner’s parsing of claim 1 in order to follow the presentation in the Petition.

We determine that the preamble of claim 1 is not limiting. The preamble recites the type of invention, “[a] method,” but does not recite any limitations or provide the antecedent basis for any limitation or claim element. However, we also agree with Petitioner that Jinno discloses a method.

providing a solar cell comprising either a single crystalline silicon material or a polycrystalline solar cell,

Petitioner cites Jinno for this limitation. Pet. 26–27. Jinno states, “[t]he semiconductor substrate can use crystalline silicon such as single crystal silicon or polycrystalline silicon.” Ex. 1005 ¶ 15. Petitioner establishes a reasonable likelihood of showing Jinno teaches this limitation.

the solar cell having a backside and a front side and a thickness, the backside having a metal material;

Petitioner relies on Figures 1 and 10 and the related descriptions of Jinno for this limitation. Pet. 27–30. Figure 1 of Jinno is reproduced below.

[FIG. 1]

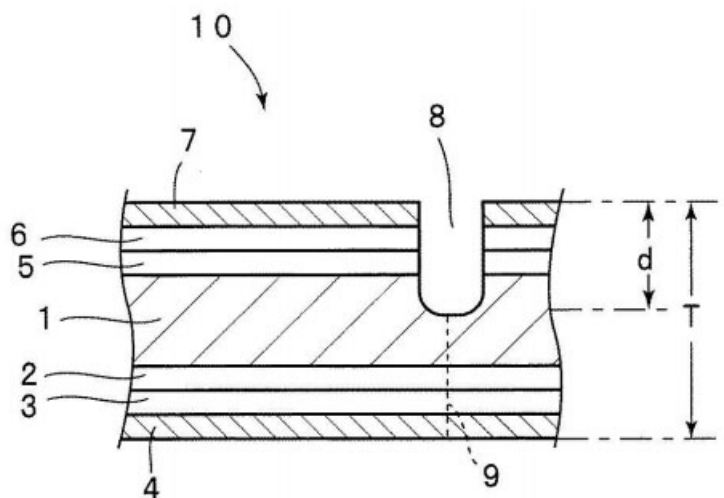


Figure 1 depicts “a cross-sectional view of the solar cell.” Ex. 1005 ¶ 41. The detailed description of Figure 1 states, “[i]n the solar cell 10 shown in FIG. 1, the primary light receiving surface is the lower surface” and “FIG. 1 shows the large-area solar cell before division with the dividing groove 8 formed from the other primary surface.” *Id.* ¶¶ 20, 22. Figure 1 has a label “T” for the overall thickness of solar cell 10 (*id.* ¶ 22) and the detailed description provides the following for the various layers:¹⁶ “i-type amorphous silicon layer 2 (thickness: about 5 nm to about 20 nm),” “p-type amorphous silicon layer 3 (thickness: about 5 nm to about 20 nm),” “transparent conductive film 4 (thickness: about 30 nm to about 150 nm),” “i-type amorphous silicon layer 5 (thickness: about 5 nm to about 20 nm),” “n-type amorphous silicon layer 6 (thickness: about 5 nm to about 20 nm),” and “transparent conductive film 7 (thickness: about 30 nm to about 150 nm)” (*id.* ¶¶ 20, 21). Figure 5 (x-axis) of Jinno provides a graphic depiction of solar cell thickness. *Id.* ¶ 30 (“The horizontal axis denotes the thickness of the solar cell.”). The description of Figure 5 states, “As shown in FIG. 5, the solar cells had three different average cell thicknesses: 115 μm, 155 μm and 200 μm.” *Id.*

With regard to “the backside having a metal material,” Petitioner cites to Figures 7–10 and the related description in Jinno. Pet. 28–30. Jinno states, “[i]n FIG. 7 (a) to FIG. 10 (a), a collector electrode 21 is formed on the solar cell 20.” Ex. 1005 ¶ 39. Figure 10 is reproduced below.

¹⁶ The thickness of middle layer 1 is not given in Jinno. It is described as “n-type single crystal silicon substrate 1.” Ex. 1005 ¶ 20.

[FIG. 10]

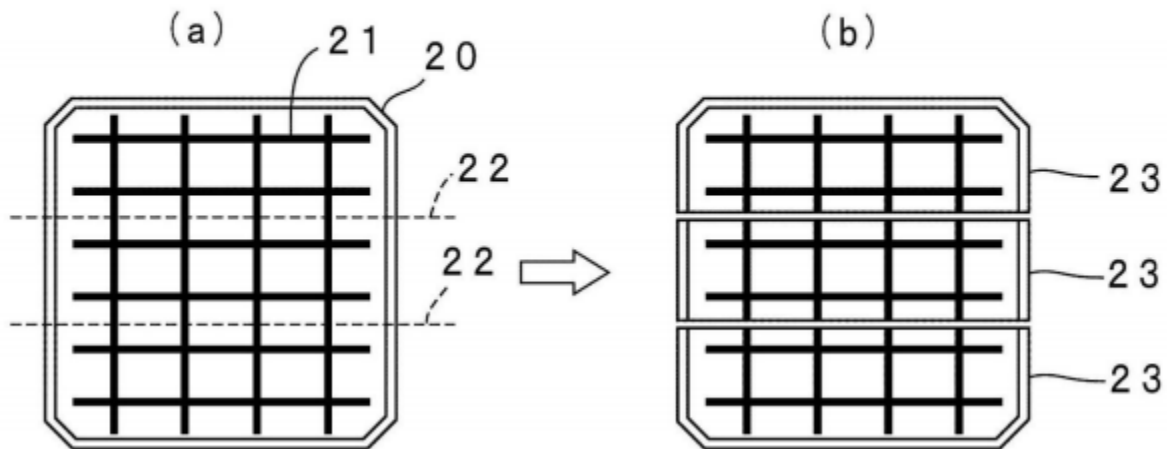


Figure 10 (a) depicts “the solar cell before cleaving and (b) shows the solar cell after cleaving.” *Id.* ¶ 38. The Petition states, “[a]s noted above, Figure 1 and paragraphs [0020] and [0022] establish that the scribed side—also shown as the top in Figure 1—is the back side of the cell. Therefore, the collector electrodes depicted in Figure 10 are located on the back side.” Pet. 28 (citing Ex. 1003 ¶ 96).

With regard to collector electrode 21 of Jinno being formed of metal, Petitioner contends that “[a] Skilled Artisan would understand that the collector electrodes disclosed in Jinno[] are made of metal” and “[t]o the extent one might argue otherwise, it would have been obvious to make the collector electrodes in Jinno[] out of metal.” Pet. 29–30 (citing Ex. 1003 (Shea Decl.) ¶¶ 93–95). Petitioner cites Dr. Shea to establish that “Jinno[] describes a type of solar cell called heterojunction intrinsic thin film, or HIT.” *Id.* at 29 (citing Ex. 1003 (Shea Decl.) ¶ 93). And, Petitioner cites

two additional references, Ex. 1008 (Jinno '604)¹⁷ and Ex. 1010 (Dao),¹⁸ to establish that these HIT-type solar cells would have been understood to have metallic-collecting electrodes. *Id.* at 29–30. Dr. Shea's Declaration states that, "[m]etal is the standard choice for collector electrodes" and "the metal materials used for contacts are well-known and capable of performing reliably over time." Ex. 1003 ¶ 95. At least at this stage, we determine that the contention that Jinno's collector electrodes would be metal to be well-supported.

Petitioner establishes a reasonable likelihood of showing Jinno teaches this limitation.

placing the front side of the solar cell on a platen such that the backside is facing a laser source;

Petitioner relies on both Jinno and Suutarinen for this limitation. Pet. 30–36. Jinno states that, in Figure 1 (reproduced above), "the primary light receiving surface is the lower surface." Ex. 1005 ¶ 20. Jinno also states that "the dividing groove 8 [is] formed from the other primary surface." *Id.* ¶ 22. And, Jinno states, "the dividing groove [is] formed by laser processing." *Id.* ¶ 27. Petitioner contends, "[t]herefore, Jinno[] discloses '*placing the front side of the solar cell . . . such that the backside is facing a laser source.*'" Pet. 32 (citing Ex. 1003 (Shea Decl.) ¶ 100).

The Petition states, "[a] Skilled Artisan would have understood

¹⁷ Japanese Unexamined Patent Application Publication – JP 2008-235604A to Jinno et al. (Certified Translation) ("Jinno '604).

¹⁸ Dao, et al., *High-Efficiency Heterojunction with Intrinsic Thin-Layer Solar Cells: A Review*, CURRENT PHOTOVOLTAIC, 1(2) 73-81 (2013).

a ‘*platen*’ to mean ‘a flat plate’ or flat table.’ *Id.* (citing Ex. 1001, 9:28 (“A [solar] cell 100 is located on a laser table 3810 at 53702.”), 10:17–20; Fig. 37; Ex. 1003 (Shea Decl.) ¶ 102); Ex. 1013, 1525). Petitioner relies on Figure 7¹⁹ and the related description in Suutarinen as “disclos[ing] a ‘*platen*’ on which the semiconductor wafer is placed.” *Id.* at 32. Figure 7 of Suutarinen is reproduced below.

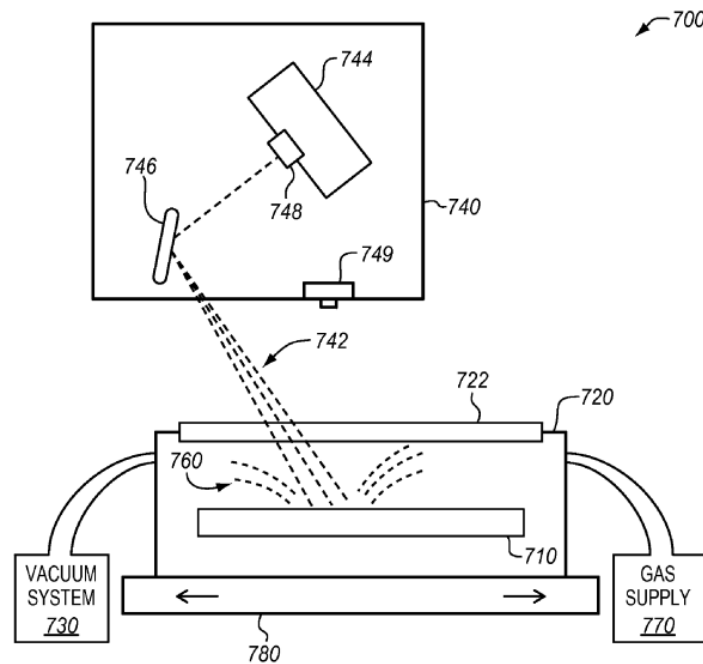


FIG. 7

Figure 7 depicts “a laser cutting system for cutting a wafer.” Ex. 1006 ¶ 22. The Petition states, “Suutarinen explains that a motion system can ‘provide movement of vacuum chamber 720 **and** wafer 710 in both the X and Y directions under laser system 740.’ In Figure [7], the motion system (780) is

¹⁹ The Petition says Figure 1. *See* Pet. 32–33. However, Figure 7 is reproduced in the Petition and the descriptions of Figures 1 and 7 are cited. *Id.* (citing Ex. 1006 ¶¶ 29, 44, 45). Figures 1 and 7 are similar, but Figure 7 is more detailed.

shown to include a flat plate or platform.” Pet. 32 (citing Ex. 1003 ¶¶ 103–106; quoting Ex. 1006 ¶ 44). And, Petitioner contends, “[a] Skilled Artisan would further understand the motion system illustrated in Suutarinen to include a ‘platen’ for supporting the wafer, as the wafer must rest on something for support, the figure shows a flat surface beneath the wafer, and a flat surface would provide uniform support to the rather fragile wafer.” *Id.* at 33–34 (citing Ex. 1003 ¶ 106; Ex. 1006 ¶ 44).

Petitioner establishes a reasonable likelihood of showing the cited art teaches this limitation.

initiating a laser source to output a laser beam;

Petitioner relies on both Jinno and Suutarinen for this limitation. Pet. 36. Jinno provides, “laser irradiation . . . [was] used for laser processing.” *Id.* (citing Ex. 1005 ¶¶ 28–29). As noted above, Figure 1 of Suutarinen shows laser cutting system 100 (Ex. 1006 ¶ 25) and Suutarinen states, “[l]aser cutting system 100 . . . comprises a laser system 140 adapted to direct a laser beam onto material 110” (*id.* ¶ 28). Petitioner establishes a reasonable likelihood of showing the cited art teaches this limitation.

subjecting a portion of the backside to the laser beam to cause an ablation to form a scribe region having a depth, width, and a length,

Petitioner relies on Jinno and Suutarinen as teaching this limitation. Pet. 39–41. Suutarinen states, “[t]hose skilled in the art will recognize that a variety of material may be cut, **scribed**, scored, grooved, trenched, deplaned or singulated using laser cutting system 100.” Ex. 1006 ¶ 30 (emphasis added).

The Petition states, “Jinno[] teaches forming a ‘dividing groove’

(‘*scribe region*’) by projecting the ‘laser beam’ on to a back face of a solar cell.” Pet. 39 (citing Ex. 1005 ¶ 22, Fig. 1). Jinno states, “the depth of the dividing groove is preferably from 35 to 65% of the thickness of the solar cell. The width of the dividing groove is preferably from 10 to 50 μm .” Ex. 1005 ¶ 13. As shown above in Figure 10 of Jinno, “the dividing groove extends the entire length of the solar panel.” See Pet. 40–41.

Petitioner establishes a reasonable likelihood of showing the cited art teaches this limitation.

the depth being from 40% to 60% of the thickness of the solar cell, and

Petitioner relies on Jinno as teaching this limitation. Pet. 41–45. As noted with regard to the immediately preceding limitation, Jinno states, “the depth of the dividing groove is preferably from 35 to 65% of the thickness of the solar cell.” Ex. 2005 ¶ 13. The preferred range taught by Jinno is broader than the range recited in claim 1 (40% to 60%) and, thus, Jinno teaches the full scope of the recited range. Petitioner establishes a reasonable likelihood of showing Jinno teaches this limitation.

the length being equivalent to a length of the solar cell;

The Petition states, “Jinno shows in Fig. 10(a) (left) and FIG. 10(b) (right) [reproduced above] that the length of the scribe region is equivalent to the length of the solar cell.” Pet. 45 (citing Ex. 1005 ¶¶ 38, 41).

Petitioner establishes a reasonable likelihood of showing Jinno teaches this limitation.

*removing a vaporized material from a vicinity of the ablation;
and*

Petitioner relies on Suutarinen for this limitation. Pet. 45–46.

Suutarinen states:

FIG. 4 illustrates a plasma cloud 402 generated when a pulse of laser beam 142 hits material 110. Some materials 110 cut by laser system 140 may generate a short plasma cloud 402 near the surface of material 110 being cut when a pulse of the laser beam 142 hits material 110. The cutting of material 110 may generate gaseous and particle debris near the surface of material 110 being cut.

Ex. 1006 ¶ 36. Suutarinen also states, “[g]as supply channel 770 provides a laminar gas flow in vacuum chamber 720 to assist the flow of plasma cloud 760 into vacuum system 730.” *Id.* ¶ 46. Petitioner establishes a reasonable likelihood of showing Suutarinen teaches this limitation.

capturing the vaporized material using a vacuum.

Petitioner relies on Suutarinen as teaching this limitation. Pet. 47–48. The Petition states, “[a]s explained above, Suutarinen teaches that ‘[w]hen laser pulses hit the material, there is a short plasma cloud generated’ along with ‘gaseous and particulate debris’—thus ‘*vaporized material*’ is generated.” *Id.* at 47 (citing Ex. 1006 ¶¶ 8, 35, 36, 38, 41). As set forth in the Petition (*id.* at 47–48), Suutarinen also teaches vacuum chamber 720 connected to vacuum system 730. *See* Ex. 1006 ¶¶ 40, 41, Fig. 7.

Suutarinen states, “[t]he vacuum system 730 may be further adapted to remove process particles or gaseous debris from vacuum chamber 720.” *Id.* ¶ 41. Petitioner establishes a reasonable likelihood of showing Suutarinen teaches this limitation.

Motivation to Combine the Relevant Teachings of Jinno and Suutarinen

Petitioner provides detailed and well-supported reasoning for combining the relevant teachings of Jinno and Suutarinen. *See* Pet. 19–26. The Petition states, “[a]s of the effective filing date of the 707 Patent, a Skilled Artisan would have found it obvious to employ the laser ablation scribing system of Suutarinen to implement the solar cell backside scribing techniques of Jinno[].” *Id.* at 19. With specific regard to combining the teachings of these references, the Petition provides:

[T]he two systems disclose analogous functionality, such as ablation or laser scribing more generally, a Skilled Artisan would understand combining their techniques to be an efficient and common sense way to implement the combined system in order to obtain the benefits of both, and therefore would have been motivated to make the combination. EX1003,¶80.

Further, Jinno[], Suutarinen, and the 707 Patent are analogous art because each is in the same field of endeavor—i.e., laser scribing and singulation of semiconductor wafers. *See* EX1005,Abstract,¶[0006]; EX1006,¶[0002]; EX1001,Abstract. Also, Jinno[] and Suutarinen are reasonably pertinent to the particular problem the inventor of the 707 Patent was trying to solve—achieving singulation without the drawbacks of mechanical sawing. *See* EX1001,2:19-20 (“Conventionally, solar cells are mechanically cut with a saw. However, this technique has numerous disadvantages.”); EX1005,[0005]; EX1006,¶[0005]; EX1003,¶81.

A Skilled Artisan would have further understood that the combination of Jinno[] and Suutarinen as analyzed here is merely an arrangement of old elements (backside laser scribing of solar cells to a depth of half the solar cell thickness (Jinno[]) and blowing gas and vacuum exhaust during laser ablation (Suutarinen)), with each performing the same function it had been known to perform (singulation of semiconductor based solar cells (Jinno[]), enhancing scribing via debris removal (Suutarinen)), and yielding no more than what one would expect from such an arrangement (laser ablation and singulation

of solar cells with removal of gaseous material generated from the laser processing). The combination could therefore have been made with a reasonable expectation of success and without undue experimentation. EX1003, ¶82.

Id. at 21–23. We determine that Petitioner has provided a showing sufficient to support institution as to why a skilled artisan would have been motivated at the time of the invention to look to the laser ablation scribing system of Suutarinen to implement the solar cell backside scribing techniques of Jinno, with a reasonable expectation of success in meeting the limitations of the claimed invention.

Summary as to Claim 1

Petitioner has shown a reasonable likelihood of showing that claim 1 of the '707 patent would have been obvious in view of the combined teachings of Jinno and Suutarinen.

2. Claims 2, 6, 8–10, and 12–20

Petitioner also contends that dependent claims 2, 6, 8–10, and 12–20 would have been obvious in view of a combination of the asserted references. *See* Pet. 48–75. As noted previously, Patent Owner does not address the merits of any portion of the Petitioner's obviousness showing. *See generally* Prelim. Resp. Thus, at this stage, Petitioner's obviousness showing as to claims 2, 6, 8–10, and 12–20 is undisputed.

We have determined that there is a reasonable likelihood that the Petitioner will prevail with respect to at least one of the claims challenged in the Petition pursuant to 35 U.S.C. § 314 and that *inter partes* review should be instituted. Accordingly, we institute as to all the challenged claims and all the challenges raised in the Petition. *SAS Institute Inc. v. Iancu*, 138 S.Ct. 1348, 1358 (2018); 37 C.F.R. §42.108 (a) (“When instituting *inter*

partes review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.”).

III. CONCLUSION

We determine that Petitioner has demonstrated a reasonable likelihood of showing at least one of the claims challenged in the Petition would have been obvious.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that an *inter partes* review is instituted on all challenged claims under all challenged grounds; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(a), *inter partes* review of the '707 patent is hereby instituted commencing on the entry date of this Decision, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial.

IPR2021-00095
Patent 10,522,707 B2

For PETITIONER:

Joseph Micallef
Michael Franzinger
STEPTOE & JOHNSON LLP
jmicallef@sidley.com
mfranzinger@sidley.com

For PATENT OWNER:

John Caracappa
Katherine Cappaert
SIDLEY AUSTIN LLP
jcaracap@steptoe.com
kcappaert@steptoe.com