

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of

**CERTAIN SHINGLED SOLAR MODULES,
COMPONENTS THEREOF, AND METHODS
FOR MANUFACTURING THE SAME**

INV. NO. 337-TA-1223

**INITIAL DETERMINATION ON VIOLATION OF SECTION 337 AND
RECOMMENDED DETERMINATION ON REMEDY AND BOND**

Administrative Law Judge Clark S. Cheney

(October 22, 2021)

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PUBLIC VERSION

Table of Contents

I.	Introduction.....	2
A.	Procedural History	2
B.	The Private Parties	4
1.	Complainant Solaria.....	4
2.	Respondent Canadian Solar	4
C.	Overview of the Technology	4
D.	The Asserted Patents.....	5
1.	U.S. Patent No. 10,763,388.....	5
2.	U.S. Patent No. 10,651,333.....	7
E.	The Accused Products.....	9
F.	The Domestic Industry Products.....	10
II.	Jurisdiction.....	11
A.	Subject Matter Jurisdiction	11
B.	Personal Jurisdiction	11
C.	<i>In Rem</i> Jurisdiction	12
III.	Standing	12
A.	The '388 Patent.....	12
1.	The '388 Invention Is Not Within the Scope of the Statement of Work	14
2.	The '388 Invention Was Conceived Prior to the Scope of Work	16
3.	SunEdison Relinquished Back to Solaria Any Rights to the '388 Invention	17
B.	The '333 Patent.....	18
IV.	Importation.....	19
V.	Legal Principles	19
A.	Claim Construction.....	19
B.	Infringement.....	21
C.	Validity	22
1.	On-Sale Bar.....	22
2.	Obviousness	23
3.	Priority and Written Description.....	25
D.	Domestic Industry.....	26
1.	Economic Prong.....	27

PUBLIC VERSION

2. Technical Prong	27
E. Unclean Hands	28
VI. Level of Ordinary Skill in the Art.....	29
VII. Claim Construction	30
VIII. Infringement.....	36
A. The '388 Patent	36
1. Claim 1	36
2. Claims 2-5, 8, 9, 11, 15-17, 19, and 20.....	38
B. The '333 Patent	39
1. Claim 1	39
2. Claims 8, 9, and 12-17	42
IX. Technical Prong of the Domestic Industry Requirement.....	44
A. The '388 Patent	44
1. Claim 1	44
2. Claims 2-5, 8, 11, 13, 14, 17, and 20	46
3. Claim 19.....	46
B. The '333 Patent	46
1. Claim 1	47
2. Claims 2, 3, 6, 8, 9, 12, 14, and 15-17	49
3. Claim 13.....	49
X. Economic Prong of the Domestic Industry Requirement	49
A. Solaria's Domestic Activities	50
1. Solaria's R&D and Engineering Activities.....	51
2. Solaria's Testing Activities.....	53
B. Solaria's Domestic Expenditures	53
1. Plant and Equipment.....	54
2. Labor and Capital.....	56
C. Significance Analysis.....	59
XI. Validity	62
A. Priority Date.....	62
1. The '388 Patent	62
2. The '333 Patent	68

PUBLIC VERSION

B. On-Sale Bar.....	71
C. The Asserted Prior Art References	71
1. Jinno-205.....	71
2. Hong.....	72
3. Morad.....	72
4. Breitenstein	72
5. Hendel.....	72
D. The '333 Patent Claims Are Not Obvious	72
1. Claim 1.....	73
2. Claim 17: “a repetition rate of between about 100-300 kHz”	76
E. The '388 Patent Claims Are Not Obvious	77
1. Morad Fails to Disclose Key Limitations	77
2. Morad in Combination with Jinno-205.....	80
3. Morad in Combination with Breitenstein and Hendel	83
F. Secondary Considerations.....	87
1. Nexus	87
2. Commercial Success	88
3. Industry Skepticism and Teaching Away	88
4. Copying.....	89
5. Secondary Considerations Conclusion	90
G. Written Description and Enablement.....	90
XII. Other Defenses to Infringement.....	92
XIII. Conclusions of Law	96
XIV. Recommended Determination on Remedy and Bond.....	97
A. Limited Exclusion Order.....	97
B. Cease and Desist Order.....	99
C. Bond During Presidential Review	101
XV. Initial Determination on Violation.....	105
XVI. Order	105

PUBLIC VERSION

Table of Abbreviations

CC Order	Order No. 7 construing certain claims
CC Tr.	Transcript of claim construction hearing
CDX	Complainant's demonstrative exhibit
CIB	Complainant's initial post-hearing brief
CPB	Complainant's pre-hearing brief
CPX	Complainant's physical exhibit
CRB	Complainant's responsive post-hearing brief
CX	Complainant's exhibit
Decl.	Declaration
Depo.	Deposition
DOE	U.S. Department of Energy
JX	Joint Exhibit
PTO	U.S. Patent and Trademark Office
RDX	Respondents' demonstrative exhibit
RFA	Request for admission
RIB	Respondents' initial post-hearing brief
RPB	Respondents' pre-hearing brief
RPX	Respondents' physical exhibit
RRB	Respondents' responsive post-hearing brief
RX	Respondents' exhibit
Tr.	Transcript

PUBLIC VERSION

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Administrative Law Judge Clark S. Cheney

(October 22, 2021)

Pursuant to the Notice of Investigation, 85 Fed. Reg. 67010 (Oct. 21, 2020), and 19 C.F.R. §§ 210.10(b), 210.42(a)(1)(i), this is the final initial determination in the matter of *Certain Shingled Solar Modules, Components Thereof, and Methods for Manufacturing the Same*, Investigation No. 337-TA-1223.

For the reasons stated herein, I have determined that a violation of section 337 of the Tariff Act of 1930, as amended, has occurred in the importation into the United States and the sale within the United States after importation of certain shingled solar modules, components thereof, and methods for manufacturing the same based on infringement of U.S. Patent No. 10,763,388 and U.S. Patent No. 10,651,333.

PUBLIC VERSION

I. INTRODUCTION

A. Procedural History

On September 15, 2020, complainant The Solaria Corporation (Solaria or Complainant) filed a complaint alleging violations of section 337 based on the importation into the United States, the sale for importation, and the sale within the United States after importation of certain shingled solar modules, components thereof, and methods for manufacturing the same. 85 Fed. Reg. 59546 (Sept. 22, 2020); *see* EDIS Doc. ID 719712. Solaria submitted a letter supplementing the complaint on September 25, 2020. *See* EDIS Doc. ID 720498.

On October 21, 2020, the Commission instituted Investigation No. 337-TA-1223 to determine:

[W]hether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain products identified in paragraph (2) by reason of infringement of one or more of claims 1, 8, 9, and 12–20 of the '707 patent [U.S. Patent No. 10,522,707]; claims 1, 8, 9, and 12–20 of the '333 patent [U.S. Patent No. 10,651,333]; and claims 1–11, 15–17, 19, and 20 of the '388 patent [U.S. Patent No. 10,763,388]; and whether an industry in the United States exists as required by subsection (a)(2) of section 337.

85 Fed. Reg. 67010 (Oct. 21, 2020) [hereinafter Notice of Investigation].

The plain language description of the accused products in the complaint defines the scope of the investigation. 19 C.F.R. § 210.10(b)(1). The products are described as “tiled solar modules, shingled solar modules, and components thereof specifically solar cells, strips of solar cells, strings of solar cells, and strings of solar cell strips, whereby such modules and components, either are covered by, or are manufactured or produced under, or by means of, a process covered by, one or more claims of the Asserted Patents.” Notice of Investigation.

PUBLIC VERSION

The Notice of Investigation named the following entities as respondents: Canadian Solar Inc. and Canadian Solar (USA) Inc. (collectively, Canadian Solar or Respondents). *Id.*

The Office of Unfair Import Investigations is not a party to this investigation. *Id.*

On November 9, 2020, I set the target date for this investigation at sixteen months, which makes this final initial determination due no later than October 22, 2021. Order No. 4 (Nov. 9, 2020).

In accordance with the procedural schedule issued as Order No. 5 on November 23, 2020, the parties submitted a joint chart of proposed claim constructions on December 11, 2020. The parties submitted opening claim construction briefs on January 8, 2021, and responsive claim construction briefs on January 22, 2021. On February 11, 2021, I convened a claim construction hearing.¹ I subsequently issued Order No. 7 [hereinafter CC Order] on April 15, 2021, construing certain disputed terms.

On January 15, 2021, Solaria and Canadian Solar submitted a joint stipulation regarding importation. JX-0007.

On June 28, 2021, I granted a motion from Solaria seeking to terminate this investigation as to the '707 patent. Order No. 9 (June 28, 2021), *unreviewed*, Comm'n Notice (July 15, 2021).

On August 2, 2021, Solaria and Canadian Solar submitted a joint stipulation regarding non-disputed issues and facts. JX-0013.

I held a prehearing conference on August 6, 2021, and convened the evidentiary hearing on August 9, 2021. The evidentiary hearing ended on August 13, 2021. *See* Tr. 1-1303.

¹ The transcript of the claim construction hearing is available as EDIS Doc. ID 734224 and is referred to in this initial determination as "CC Tr."

PUBLIC VERSION

On September 14, 2021, I granted a motion from Solaria seeking to terminate this investigation as to claims 18-20 of the '333 patent and claims 6, 7, and 10 of the '388 patent. Order No. 13 (Sept. 14, 2021), *unreviewed*, Comm'n Notice (Oct. 13, 2021).

B. The Private Parties

1. Complainant Solaria

Complainant Solaria is a Delaware corporation with its principal place of business at 45700 Northport Loop East, Fremont, California 94538. Compl. ¶ 12. Solaria designs, develops, and sells high-efficiency photovoltaic solar modules primarily for residential applications. Tr. (Sharma) at 47:3-22.

2. Respondent Canadian Solar

Respondent Canadian Solar Inc. is organized under the laws of British Columbia and has a principal place of business in Ontario, Canada. Canadian Solar's Response to Solaria's Complaint and the Notice of Investigation ¶ 17, EDIS Doc. ID 725436 (Nov. 17, 2020) [hereinafter Canadian Solar Resp.].

Respondent Canadian Solar (USA) Inc. is a majority-owned indirect subsidiary of Canadian Solar Inc. *Id.* ¶ 19. Canadian Solar (USA) Inc. has offices located at 3000 Oak Road, Ste. 400, Walnut Creek, California 94597. *Id.*

C. Overview of the Technology

Solar cell devices, which are also known as photovoltaic or PV devices, take in sunlight and convert it to electricity. Tr. (Gibson) at 219:18-25. Traditional solar cell modules generate electricity using 6-inch by 6-inch square solar cells connected by a ribbon wire along the surface of the solar module. Tr. (Gibson) at 220:4-23. At issue in this investigation are specific types of solar modules called "shingled solar modules." These modules take solar cells and divide them

PUBLIC VERSION

into smaller strips through a scribing and singulation process. Tr. (Gibson) at 220:4-23. A shingled solar cell module is made from singulated strips that overlap each other like roof shingles. See Tr. (Gibson) at 220:4-23. Because shingling reduces the module surface area not useful for generating electricity, the shingling process increases the module power by about 10% and increases the energy-producing (or active) area of the solar module by about 3%. See Tr. (Gibson) at 220:24-221:9, 231:2-232:17.

D. The Asserted Patents

Solaria presently asserts claims from two patents in this investigation: the '388 patent and the '333 patent (collectively, the Asserted Patents). Both Asserted Patents are continuations of U.S. Patent Application No. 15/622,000, which was filed on June 13, 2017, and issued as U.S. Patent No. 10,347,788 on July 9, 2019. JX-0001 at cover page [hereinafter '388 patent]; JX-0004 at cover page [hereinafter '333 patent]. The Asserted Patents each claim priority to U.S. Patent Provisional Application No. 62/349,547 (the '547 provisional application) filed on June 13, 2016, and also claim priority to U.S. Patent Application No. 14/609,307, which was filed on January 29, 2015. '388 patent at cover page; '333 patent at cover page.

1. U.S. Patent No. 10,763,388

The '388 patent, titled "Tiled Solar Cell Laser Process," issued on September 1, 2020, and names Kevin R. Gibson, Aureo Parilla, and Thomas Phu as inventors. '388 patent at cover page. The '388 patent issued from application no. 16/844,693, filed on April 9, 2020, and expires on January 29, 2035. *Id.*; see Compl. ¶ 39.

The '388 patent is a continuation of U.S. Patent Application No. 15/622,000, which was filed on June 13, 2017, and issued as U.S. Patent No. 10,347,788 on July 9, 2019. '388 patent at cover page. The '388 patent claims priority to U.S. Patent Provisional Application No. 62/349,547

PUBLIC VERSION

filed on June 13, 2016, and also claims priority to U.S. Patent Application No. 14/609,307, which was filed on January 29, 2015. '388 patent at cover page.

The '388 patent is assigned to Solaria. *Id.*

Solaria asserts that Canadian Solar's products infringe claims 1-5, 8, 9, 11, 15-17, 19, and 20 of the '388 patent. *See* Notice of Investigation; Order No. 9; Order No. 13; CIB at 6. To prove satisfaction of the technical prong of the domestic industry requirement, Solaria relies on claims 1-5, 8, 11, 13, 14, 17, and 20 of the '388 patent (collectively, '388 Asserted Domestic Industry Claims). *See* CIB at 8. The claims at issue in this investigation read as follows:

1. An apparatus comprising:

a solar module having a plurality of strings, each of the plurality of strings being configured in a parallel electrical arrangement with each other;

a plurality of overlapped photovoltaic strips forming each of the plurality of photovoltaic strings separated from a solar cell, an edge of each of the overlapped photovoltaic strips comprising,

a kerf in a back side of the strip having a depth of from 40% to 60% of a thickness of the solar cell and cut by an ablation from multiple passes of a laser beam, and

a crack extending from the kerf to a front side of the photovoltaic strip, the crack initiated by application of stress;

a first end termination configured along a first end of each of the plurality of strings; and

a second end termination configured along a second end of each of the plurality of strings.

2. The apparatus of claim 1 wherein the crack defines a fracture plane.

3. The apparatus of claim 1 wherein the thickness is from 170 to 220 microns.

4. The apparatus of claim 1 wherein the depth is between about 65 and 132 microns.

PUBLIC VERSION

5. The apparatus of claim 1 wherein each of the plurality of overlapped photovoltaic strips comprises a plurality of fingers on the front side.
8. The apparatus of claim 1 wherein each of the plurality of overlapped photovoltaic strips comprises a bus bar on the front side.
9. The apparatus of claim 1 wherein each of the plurality of overlapped photovoltaic strips comprises a bus bar on the back side.
11. The apparatus of claim 1 further comprising an Electrically Conducting Adhesive (ECA) between overlapped photovoltaic strips.
13. The apparatus of claim 1 wherein each of the plurality of overlapped photovoltaic strips has a width of about $\frac{1}{5}$ th a width of the solar cell.
14. The apparatus of claim 13 wherein each of the plurality of overlapped photovoltaic strips has the width of about 31.2 mm.
15. The apparatus of claim 1 wherein each of the plurality of overlapped photovoltaic strips has a width of about $\frac{1}{6}$ th a width of the solar cell.
16. The apparatus of claim 15 wherein each of the plurality of overlapped photovoltaic strips has the width of about 26 mm.
17. The apparatus of claim 1 wherein the crack is formed by the application of mechanical stress.
19. The apparatus of claim 1 wherein the laser beam comprises an infrared (IR) laser.
20. The apparatus of claim 1 wherein the multiple passes of the laser beam comprise a repetition rate of between about 100-300 kHz.

'388 patent at claims 1-5, 8, 9, 11, 13-17, 19, and 20.

2. U.S. Patent No. 10,651,333

The '333 patent, titled "Tiled Solar Cell Laser Process," issued on May 12, 2020, and names Kevin Gibson, Aureo Parilla, and Thomas Phu as inventors. '333 patent at cover page. The '333 patent issued from application no. 16/691,408, filed on November 21, 2019, and expires on January 29, 2035. *Id.*; see Compl. ¶ 33.

PUBLIC VERSION

The '333 patent is a continuation of U.S. Patent Application No. 15/622,000, which was filed on June 13, 2017, and issued as U.S. Patent No. 10,347,788 on July 9, 2019. '333 patent at cover page. The '333 patent claims priority to U.S. Patent Provisional Application No. 62/349,547 filed on June 13, 2016, and also claims priority to U.S. Patent Application No. 14/609,307, which was filed on January 29, 2015. '333 patent at cover page.

The '333 patent is assigned to Solaria. *Id.*

Solaria asserts that manufacture of the Accused Products by Canadian Solar infringes claims 1, 8, 9, and 12-17 of the '333 patent. *See* Notice of Investigation; Order No. 9; Order No. 13; CIB at 8. To prove satisfaction of the technical prong of the domestic industry requirement, Solaria relies on claims 1, 2, 3, 6, 8, 9, 12, 14, and 15-17 of the '333 patent (collectively, '333 Asserted Domestic Industry Claims). *See* CIB at 9. The claims at issue in this investigation read as follows:

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 at least twice 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.

2. The method of claim 1 wherein removing the vaporized material comprises subjecting a fluid, using a laminar flow, within the vicinity of the ablation.

PUBLIC VERSION

3. The method of claim 1 wherein removing the vaporized material comprises delivering a jet of fluid to the vicinity of the ablation.
6. The method of claim 1 wherein the laser beam has a wavelength in a green portion of the spectrum.
8. The method of claim 1 wherein the laser source comprises an infrared (IR) laser.
9. The method of claim 1 wherein the scribe region is shaped as a notch as viewed along an end of the scribe region.
12. The method of claim 1 wherein the thickness is from 170 to 220 microns.
13. The method of claim 1 wherein the length is 156 mm \pm 2 mm.
14. The method of claim 1 wherein the depth is between about 65 and 132 microns.
15. The method of claim 1 wherein the width is from about 15% to 40% of the depth.
16. The method of claim 1 wherein the width is from about 7% to 20% of the thickness.
17. The method of claim 1 wherein subjecting the portion of the backside to the laser beam comprises applying the laser beam at a repetition rate of between about 100-300 kHz.

'333 patent at claims 1-3, 6, 8, 9, 12-17.

E. The Accused Products

Three Canadian Solar models are at issue in this investigation: HiDM CS1H modules, HiDM CS1H Black modules, and HiDM5 CS1Y modules (collectively, Accused Products). Solaria alleges that all three models infringe all asserted claims of the '388 patent. *See* CIB at 9-10. Solaria also asserts that manufacture of the Accused Products by Canadian Solar infringes all asserted claims of the '333 patent except for claim 13, which Solaria asserts is only infringed by Canadian Solar's manufacture of the HiDM CS1H modules and the HiDM CS1H Black modules. *See id.*

PUBLIC VERSION

Solaria's expert Dr. Banerjee testified that he analyzed the Accused Products and found no material differences in the manufacturing process across the three accused models. Tr. (Banerjee) at 489:5-491:9. The only difference between the CS1H and CS1H Black modules is that the latter contain a black frame and backing, but this cosmetic difference does not affect the infringement analysis in this investigation. *See* Tr. (Banerjee) at 489:25-490; CX-0867C (Liu Depo. Tr.) at 26:14-27:12. The CS1H and CS1Y modules differ only in the size of the modules and the size of the solar cells used to make each product. *See* Tr. (Banerjee) at 490:14-491:9; CX-0867C (Liu Depo. Tr.) at 31:3-20; CPX-0010 (comparison photograph). The difference between the CS1H and CS1Y modules is material only to the infringement analysis of claim 13 of the '333 patent, which requires a scribe region having a length of 156 mm \pm 2 mm. *See* CIB at 9-10.

In view of the parties' stipulation regarding non-disputed issues and the testimony provided by Dr. Banerjee and Mr. Liu, the Accused Products will be treated identically for purposes of the infringement analysis set forth below, with the exception of claim 13 of the '333 patent.

F. The Domestic Industry Products

Solaria relies on three product families to show satisfaction of the technical prong of the domestic industry requirement: 300 Series PD modules, 300 Series AC Modules, and 400 Series Power XT PM modules (collectively, Domestic Industry Products). *See* CIB at 10. The Domestic Industry Products are manufactured at a SolarPark facility in South Korea. *See* Tr. (Sharma) at 91:14-19; 93:10-94:5. Two types of lasers have been used to manufacture the Domestic Industry Products: a green laser provided by a company called Genesem and put into production for Solaria in June 2016, and an infrared laser provided by a company called Applied Materials (AMAT) and put into production for Solaria in August 2019. *See* CIB at 4.

PUBLIC VERSION

Solaria asserts all Domestic Industry Products practice the '388 patent. *See* CIB at 10. Solaria also asserts that its manufacture of the Domestic Industry Products using Genesem and AMAT equipment practices the '333 patent. *See id.*

II. JURISDICTION

A. Subject Matter Jurisdiction

Section 337 of the Tariff Act prohibits the importation, the sale for importation, or the sale after importation of articles that infringe a valid and enforceable patent if an industry exists in the United States relating to articles protected by the patent. 19 U.S.C. §§ 1337(a)(1)-(2). Solaria's complaint states a cause of action under section 337 by alleging that Canadian Solar imports, sells for importation, and sells after importation certain solar modules and components thereof that infringe the Asserted Patents. *See* Compl. at 16-24. No party has contested the Commission's subject matter jurisdiction over this investigation. I determine the Commission has subject matter jurisdiction over this investigation.

B. Personal Jurisdiction

By filing a complaint and participating in this investigation, Solaria has consented to personal jurisdiction at the Commission. *See Certain Toner Cartridges, Components Thereof, and Systems Containing the Same*, Inv. No. 337-TA-1174, Initial Determination at 34-35 (July 23, 2020), *unreviewed*, Comm'n Notice (Sept. 8, 2020). Canadian Solar has participated in this investigation by, among other things, responding to the complaint and notice of investigation and participating in discovery, thereby submitting itself to the personal jurisdiction of the Commission. I therefore find that the Commission has personal jurisdiction over all parties. *See, e.g., Certain Strontium-Rubidium Radioisotope Infusion Systems, and Components Thereof Including*

PUBLIC VERSION

Generators, Inv. No. 337-TA-1110, Initial Determination at 9 (Aug. 1, 2019), *not reviewed in pertinent part*, Comm'n Notice (Sept. 30, 2019).

C. In Rem Jurisdiction

As the parties have stipulated that the Accused Products have been imported into the United States, I find the Commission has *in rem* jurisdiction over the Accused Products in this investigation. JX-0007; *see Sealed Air Corp. v. Int'l Trade Comm'n*, 645 F.2d 976, 985-86 (C.C.P.A. 1981) (noting the Commission has jurisdiction over imported goods).

III. STANDING

Solaria is the owner by assignment of the Asserted Patents. *See* '388 patent; JX-0002 ('388 patent certified assignment reel); '333 patent; JX-0005 ('333 patent certified assignment reel). The recording "creates a presumption of validity as to the assignment and places the burden to rebut such a showing on one challenging the assignment." *SiRF Tech., Inc. v. Int'l Trade Comm'n*, 601 F.3d 1319, 1328 (Fed. Cir. 2010).

A. The '388 Patent

Canadian Solar disputes that Solaria has standing to assert the '388 patent in this investigation. *See* RIB at 7-21. Canadian Solar argues that Solaria assigned "all intellectual property rights to the shingled solar module claimed in the 388 Patent" to non-party SunEdison, Inc. (SunEdison) and therefore Solaria lacks standing to bring a complaint based on that patent. *Id.* at 7. As explained below, Canadian Solar has not met its burden to show Solaria lacks standing.

Commission Rule 210.12 requires that intellectual property-based complaints "include a showing that at least one complainant is the owner or exclusive licensee of the subject intellectual property." 19 C.F.R. § 210.12(a)(7). In applying this rule, the Commission has adopted the

PUBLIC VERSION

standing requirement established by the federal courts in patent infringement cases. *See SiRF Tech.*, 601 F.3d at 1326 n.4 (noting the Commission strictly reads the federal standing precedent into its rules of procedure); *Certain Optical Disc Drives, Components Thereof, and Products Containing the Same*, Inv. No. 337-TA-897, Comm’n Op. at 4, EDIS Doc. No. 548902 (Dec. 4, 2014) (public version Jan. 7, 2015). Under that framework, a complaint of patent infringement may “be brought by a party holding legal title to the patent.” *Abbott Labs. v. Diamedix Corp.*, 47 F.3d 1128, 1130 (Fed. Cir. 1995) (citing 35 U.S.C. §§ 100(d), 281); *see also Ball v. Coker*, 168 F.3d 304, 307 (C.C.D.S.C. 1909) (“[N]o person may bring suit for profits or damages for infringement who is not the patentee, or such assignee or grantee as the statute points out.”).

The named inventors named on the ’388 patent assigned their ownership rights in that patent to Solaria, and that assignment was recorded with the U.S. Patent and Trademark Office. JX-0002 (certified assignment reel); JX-0001 (’388 patent cover). The recording “creates a presumption of validity as to the assignment and places the burden to rebut such a showing on one challenging the assignment.” *SiRF Tech.*, 601 F.3d at 1328.

Canadian Solar does not contest the assignment of the invention from the inventors to Solaria. Instead, Canadian Solar’s standing argument is built upon an agreement between Solaria and SunEdison titled “Amended and Restated Joint Development and Technology License Agreement.” RX-0128C (Joint Development Agreement or JDA). In the agreement, Solaria stated that it “hereby assigns to SunEdison all right, title and interest to all Developed Product Technology and all intellectual property rights therein and thereto.” RX-0128C ¶ 3.2(b). To determine what exactly is encompassed by the term “Developed Product Technology” requires working through a daisy chain of definitions in the JDA. Relevant here, the JDA requires the assigned Developed Product Technology to be “developed or conceived . . . solely in the course

PUBLIC VERSION

of any Joint Development pursuant to a Statement of work.” *See* RX-0128C ¶ 1.(e). The JDA gives examples of technology in this category, including intellectual property “embodied in or relating to ‘zero-white space’ modules.” *Id.*

Canadian Solar argues that Zero White Space modules developed under the JDA embody the ’388 patent claims, and therefore Solaria assigned that technology to SunEdison in the JDA. RIB at 7-8. Canadian Solar’s argument fails for at least the three reasons discussed below.

1. The ’388 Invention Is Not Within the Scope of the Statement of Work

As noted above, Solaria’s obligation to assign an invention only applies to inventions developed pursuant to a statement of work, or SOW. The only statement of work cited by Canadian Solar is an agreement between Solaria and SunEdison that was fully executed on July 22, 2015. *See* RIB at 7-8; RX-0129C.0004. For the invention claimed in the ’388 patent to be assigned to SunEdison, then, the invention must have been developed under the July 22, 2015, statement of work. Canadian Solar cites three deliverables in the statement of work to support its argument. But, as discussed below, the invention in the ’388 patent was not within the scope of those deliverables.

Deliverable #1 required Solaria to deliver (1) a stringer tool capable of assembling a string of cell strips with certain dimensions and (2) a method for curing electrically conductive adhesive (ECA) within certain times. RX-0129C ¶ 2. I find that the invention of the ’388 patent, which is a shingled solar cell made using a certain laser cut, is not a tool for assembling a string of solar cells and is not a method for curing adhesive. I therefore find that the invention of the ’388 patent was not developed pursuant to Deliverable #1.

Deliverable #2 required Solaria to deliver a Zero White Space (ZWS) module design. RX-0129C ¶ 2-3. Even though this deliverable is for a solar cell, the requirements of this

PUBLIC VERSION

deliverable indicate that the invention of the '388 patent was not within its scope. Deliverable #2 required the design to have certain dimensions and power ratings and to meet certain UL standards. None of these requirements specified how solar cells were to be diced, let alone that they should be diced using a laser in a certain way.

Canadian Solar focuses on evidence that the module Solaria produced in satisfaction of this deliverable satisfies claim 1 of the '388 patent. But that evidence does not mean that the inventive attributes claimed in the '388 patent were developed pursuant to the deliverable. To illustrate this point, suppose Solaria developed a protective polymer that inhibited dust build-up on the solar cell, and Solaria delivered to SunEdison a module that met the requirements of Deliverable #2 and also happened also to be coated in the polymer. SunEdison would not be assigned patent rights to the polymer; the polymer was not developed pursuant to Deliverable #2, which says nothing about a polymer or protective coating.

So also here. Deliverable #2 says nothing about developing a method for producing strips. Solaria could have satisfied Deliverable #2 using saw-cut strips or mechanically scribed strips; the manner of cutting was not within Solaria's marching orders for Deliverable #2. Additionally, there is no evidence that the invention in the '388 patent was developed intentionally or serendipitously in the course of pursuing an express requirement of Deliverable #2. In sum, I find that the invention of the '388 patent was not developed pursuant to Deliverable #2.

Deliverable #3 required Solaria to install a production line at SunEdison. RX-0129C ¶ 3. While Canadian Solar mentions this deliverable in passing, it presents no developed argument that the '388 invention was developed pursuant to Deliverable #3. *See* RIB at 7, 12. If anything, Canadian Solar's brief indicates that Deliverable #3 was directed to building equipment for a

PUBLIC VERSION

production line, not to figuring out the parameters for a laser cut. *Id.* I find that the invention of the '388 patent was not developed pursuant to Deliverable #3.

2. The '388 Invention Was Conceived Prior to the Scope of Work

As noted above, Solaria's assignment obligation in the JDA only applies to technology "developed or conceived . . . *solely* in the course of any Joint Development pursuant to a Statement of work." RX-0128C ¶ 1.(e) (emphasis added). Thus, if *some* development of a technology occurred outside of the July 22, 2015, statement of work, Solaria did not agree to assign the technology to SunEdison. Similarly, if *conception* of an invention occurred before the July 22, 2015, statement of work, Solaria did not agree to assign the invention to SunEdison.²

Solaria adduced evidence to show it had conceived of a shingled solar module in September 2014 and built a prototype of that shingled solar module by December 2014. CX-0933C; CX-0911C. On January 29, 2015, Solaria continued its development of the invention by filing U.S. Patent Application No. 14/609,307, directed toward a shingled solar module that contains a plurality of strings configured in a parallel electrical arrangement. CX-0414. This patent application disclosed many of the shingled module elements claimed in the '388 patent. *See id.* Solaria's work on the shingled solar module claimed in the '388 patent thus predates the July 22, 2015, statement of work, so the invention was not "developed or conceived . . . solely in the course

² Canadian Solar argues the relevant date for triggering Solaria's assignment obligation is February 6, 2015, citing to RX-0127C. *See* RIB at 8. That exhibit, however, is a proposal signed only by Solaria. *See* RX-0127C.0023. It was met by a counteroffer by Sun Edison. *See* CX 0596C; CX-0597C. Thus the parties lacked mutual assent as to the formation of a contract. *See* Restatement (Second) of Contracts § 18. But even if Solaria's assignment obligation started on February 6, 2015, the evidence demonstrates that Solaria conceived of the '388 invention and began developing it before that time.

PUBLIC VERSION

of” the statement of work. I find that under the terms of the JDA Solaria did not agree to assign its previously conceived invention to SunEdison for this independent reason.

3. SunEdison Relinquished Back to Solaria Any Rights to the ’388 Invention

The record evidence indicates that SunEdison did not perform its obligations under the JDA and entered bankruptcy. RX-0771C (Aug. 2016 Stipulation Terminating JDA); Tr. (Sharma) at 111:19-113:4. Solaria made claims against SunEdison as a creditor in the bankruptcy proceedings. Tr. (Sharma) at 111:19-113:4. In November 2018, Solaria and SunEdison entered into a stipulation as part of the bankruptcy proceedings. CX-0757C. Solaria agreed to withdraw its bankruptcy objections. *Id.* In exchange, SunEdison agreed, among other things, to deliver a piece of expensive equipment to Solaria and agreed that “[a]ll rights, claims, and obligations” of SunEdison under the JDA, “including any and all intellectual property rights provided thereunder, shall be deemed terminated.” CX-0757C at 3. At the hearing, Solaria founder and former CEO Mr. Sharma testified that this stipulation fully terminated any rights either side had in the other’s intellectual property. Tr. (Sharma) at 114:6-22. Mr. Sharma’s characterization of this stipulation was un rebutted by other testimony or evidence.

Canadian Solar argues that, by the time of the bankruptcy stipulation, SunEdison already held legal title to the invention in the yet-unissued ’388 patent and that the bankruptcy stipulation terminating SunEdison IP rights did not rescind SunEdison’s legal title to the invention. RIB at 13-14.

I have determined above that Solaria was never obligated to assign rights in the ’388 invention to SunEdison, and it did not do so. Under that determination, SunEdison had no rights in the ’388 invention to “terminate.” But to the extent that SunEdison did have rights to the

PUBLIC VERSION

invention that would eventually be claimed in the '388 patent, I determine SunEdison returned any rights to Solaria for consideration in the November 2018 bankruptcy stipulation. Given the context of the bankruptcy stipulation, its text is not susceptible to any contrary interpretation.

In sum, Canadian Solar has not shown that Solaria lacks standing to bring a section 337 complaint based on alleged infringement of the '388 patent.³ The presumption of standing that accompanies Solaria's assignment registration carries the day. *SiRF Tech.*, 601 F.3d at 1328 (recording a patent assignment "creates a presumption of validity as to the assignment and places the burden to rebut such a showing on one challenging the assignment").

Therefore, for the reasons set forth above, I find that Solaria has standing with respect to the '388 patent.

B. The '333 Patent

Canadian Solar does not dispute that Solaria has standing to assert the '333 patent in this investigation.⁴ *See* RRB at 49-57. I therefore find that Solaria has standing with respect to the '333 patent.

³ Canadian Solar's post-hearing brief presents new contentions as to why Solaria does not have standing to assert the '388 patent. First, Canadian Solar argues that the 2017 agreement only terminated "license rights either side had received to the other's IP." RIB at 13. Second, Canadian Solar argues that two other entities—GCL or Corner Star—own the '388 patent through the purchases originating with SunEdison. RIB at 14-15. I do not consider these untimely arguments. *See* Order No. 8 at Ground Rule 11.2 (June 22, 2020) (deeming a contention abandoned or withdrawn if it is not set forth in detail in a party's pre-hearing brief).

⁴ Canadian Solar's post-hearing brief contains a statement that, had Solaria been required to convey title to the invention claimed in the '333 patent in accordance with the terms of a grant it received from the U.S. Department of Energy, "Solaria would not have had standing to initiate this investigation against Canadian Solar, nor would it have the ability to maintain this investigation now." RIB at 28. Canadian Solar did not raise this contention in its pre-hearing brief and so I do not consider it. *See* Order No. 8 at Ground Rule 11.2 (deeming a contention abandoned or withdrawn if it is not set forth in detail in a party's pre-hearing brief).

PUBLIC VERSION

IV. IMPORTATION

To prove a violation of section 337 by any particular respondent, the complainant must show that the respondent engaged in “[t]he importation into the United States, the sale for importation, or the sale within the United States after importation by the owner, importer, or consignee” of products accused of infringement. 19 U.S.C. §§ 1337(a)(1)(A)-(B). Canadian Solar has stipulated that the Accused Products have been imported into the United States and does not dispute that the importation requirement of section 337 has been satisfied. JX-0007 ¶ 2 and Ex. A; Tr. (Koerner) at 793:3-16. I therefore find that the importation requirement of section 337 has been satisfied.

V. LEGAL PRINCIPLES

A. Claim Construction

“An infringement analysis entails two steps. The first step is determining the meaning and scope of the patent claims asserted to be infringed. The second step is comparing the properly construed claims to the device accused of infringing.” *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995) (*en banc*) (internal citations omitted), *aff’d*, 517 U.S. 370 (1996). Claim construction resolves legal disputes between the parties regarding claim scope. *See Eon Corp. IP Holdings v. Silver Spring Networks*, 815 F.3d 1314, 1319 (Fed. Cir. 2016).

Evidence intrinsic to the application, prosecution, and issuance of a patent is the most significant source of the legally operative meaning of disputed claim language. *See Bell Atl. Network Servs., Inc. v. Covad Commc’ns Grp., Inc.*, 262 F.3d 1258, 1267 (Fed. Cir. 2001). The intrinsic evidence includes the claims themselves, the specification, and the prosecution history. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (*en banc*); *see also Markman*, 52 F.3d at 979. As the Federal Circuit explained in *Phillips*, courts must analyze each of these

PUBLIC VERSION

components to determine the “ordinary and customary meaning of a claim term” as understood by a person of ordinary skill in the art at the time of the invention. 415 F.3d at 1313.

“It is a ‘bedrock principle’ of patent law that ‘the claims of a patent define the invention to which the patentee is entitled the right to exclude.’” *Phillips*, 415 F.3d at 1312 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). “[T]he claims themselves provide substantial guidance as to the meaning of particular claim terms.” *Id.* at 1314; see *Interactive Gift Express, Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1331 (Fed. Cir. 2001) (“In construing claims, the analytical focus must begin and remain centered on the language of the claims themselves, for it is that language that the patentee chose to use to ‘particularly point[] out and distinctly claim[] the subject matter which the patentee regards as his invention.’”). The context in which a term is used in an asserted claim can be “highly instructive.” *Phillips*, 415 F.3d at 1314. Additionally, other claims in the same patent, asserted or unasserted, may also provide guidance as to the meaning of a claim term. *Id.*

The specification “is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.” *Id.* at 1315 (quoting *Vitronics Corp. v. Conceptoronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). “[T]he specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor’s lexicography governs.” *Id.* at 1316. “In other cases, the specification may reveal an intentional disclaimer, or disavowal, of claim scope by the inventor.” *Id.* As a general rule, however, the particular examples or embodiments discussed in the specification are not to be read into the claims as limitations. *Id.* at 1323. In the end, “[t]he construction that stays true to the claim language and most naturally aligns with the

PUBLIC VERSION

patent’s description of the invention will be . . . the correct construction.” *Id.* at 1316 (quoting *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998)).

When the intrinsic evidence does not establish the meaning of a claim, then extrinsic evidence (*i.e.*, all evidence external to the patent and the prosecution history, including dictionaries, inventor testimony, expert testimony, and learned treatises) may be considered. *Id.* at 1317. Extrinsic evidence is generally viewed as less reliable than the patent itself and its prosecution history in determining how to define claim terms. *Id.* “The court may receive extrinsic evidence to educate itself about the invention and the relevant technology, but the court may not use extrinsic evidence to arrive at a claim construction that is clearly at odds with the construction mandated by the intrinsic evidence.” *Elkay Mfg. Co. v. Ebco Mfg. Co.*, 192 F.3d 973, 977 (Fed. Cir. 1999).

B. Infringement

In a section 337 investigation, the complainant bears the burden of proving infringement of the asserted patent claims by a preponderance of the evidence. *See Spansion, Inc. v. Int’l Trade Comm’n*, 629 F.3d 1331, 1349 (Fed. Cir. 2010). This standard “requires proving that infringement was more likely than not to have occurred.” *Warner-Lambert Co. v. Teva Pharm. USA, Inc.*, 418 F.3d 1326, 1341 n.15 (Fed. Cir. 2005).

“[W]hoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.” 35 U.S.C. § 271(a). “Literal infringement requires the patentee to prove that the accused device contains each limitation of the asserted claim(s). If any claim limitation is absent, there is no literal infringement as a matter of law.” *Bayer AG v. Elan Pharm. Research Corp.*, 212 F.3d 1241, 1247 (Fed. Cir. 2000). For method claims,

PUBLIC VERSION

“infringement under § 271(a) occurs where all steps of a claimed method are performed by or attributable to a single entity.” *Akamai Techs., Inc. v. Limelight Networks, Inc.*, 797 F.3d 1020, 1022 (Fed. Cir. 2015) (citing *BMC Res., Inc. v. Paymentech, L.P.*, 498 F.3d 1373, 1379-81 (Fed. Cir. 2007)). Literal infringement is a question of fact. *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1332 (Fed. Cir. 2008).

C. Validity

A patent is presumed valid. *See* 35 U.S.C. § 282; *Microsoft Corp. v. i4i Ltd. P’ship*, 131 S. Ct. 2238, 2242 (2011). A respondent who has raised patent invalidity as an affirmative defense has the burden of overcoming this presumption by clear and convincing evidence. *See Microsoft*, 131 S. Ct. at 2242. The patent validity questions in this investigation are governed by the Patent Act after it was amended by the America Invents Act (AIA).

1. On-Sale Bar

Under 35 U.S.C. § 102(b), the on-sale bar “applies when two conditions are satisfied before the critical date.” *Pfaff v. Wells Elecs*, 525 U.S. 55, 67 (1998). “[T]he product must be the subject of a commercial offer for sale” and “the invention must be ready for patenting.” *Id.* Ready for patenting requires “proof of reduction to practice before the critical date” or “proof that prior to the critical date the inventor had prepared drawings or other descriptions of the invention that were sufficiently specific to enable a person skilled in the art to practice the invention.” *Id.* at 67-68. “[W]hen development and verification are needed in order to prepare a patent application that complies with § 112, the invention is not yet ready for patenting.” *Space Sys./Loral, Inc. v. Lockheed Martin Corp.*, 271 F.3d 1076, 1080 (Fed. Cir. 2001). Actual reduction to practice requires “(1) construct[ing] an embodiment or performed a process that met all the limitations and (2) determin[ing] that the invention would work for its intended purpose.” *Barry v. Medtronic*,

PUBLIC VERSION

Inc., 914 F.3d 1310, 1322 (Fed. Cir. 2019) (successful surgeries practicing claimed method did not constitute reduction to practice because inventor had not yet determined method worked for its intended purpose); *see also Polara Eng'g, Inc. v. Campbell Co.*, 894 F.3d 1339, 1349 (Fed. Cir. 2018) (public tests not invalidating because “needed to test the claimed invention at actual crosswalks of different sizes and configurations and where the prototype would experience different weather conditions to ensure that the invention would work for its intended purpose”); *Honeywell Int’l Inc. v. Universal Avionics Systems Corp.*, 488 F.3d 982 (Fed. Cir. 2007) (recognizing invention might not be ready for patenting until inventor ascertains how invention will function in practical circumstances).

For process patents, a patentee’s sale of a product made by the patented process renders the patent invalid when sold before the critical date. *ResQNet.com, Inc. v. Lansa, Inc.*, 594 F.3d 860, 867 (Fed. Cir. 2010); *In re Caveney*, 761 F.2d 671, 675 (Fed. Cir. 1985); *see also D.L. Auld Co. v. Chroma Graphics Corp.*, 714 F.2d 1144, 1147-48 (Fed. Cir. 1983); *Helsinn Healthcare S.A. v. Teva Pharms. USA, Inc.*, 139 S. Ct. 628, 633 (2019) (the America Invents Act did not change the meaning of the statutory on-sale bar).

As to the critical date, a patentee’s on-sale activity constitutes prior art only if it occurred more than one year before the effective filing date. 35 U.S.C. §102(b)(1)(A).

2. Obviousness

Under 35 U.S.C. § 103, a patent may be found invalid as obvious if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” 35 U.S.C. § 103(a). Because obviousness is determined at the time of invention, rather than the date of litigation, “[t]he great challenge of the

PUBLIC VERSION

obviousness judgment is proceeding without any hint of hindsight.” *Star Scientific, Inc. v. R.J. Reynolds Tobacco Co.*, 655 F.3d 1364, 1375 (Fed. Cir. 2011).

When a patent is challenged as obvious, the critical inquiry in determining the differences between the claimed invention and the prior art is whether there is an apparent reason to combine the known elements in the fashion claimed by the patent at issue. *See KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 417-18 (2007). Thus, based on a combination of several prior art references, “the burden falls on the patent challenger to show by clear and convincing evidence that a person of ordinary skill in the art would have had reason to attempt to make the composition or device, or carry out the claimed process, and would have had a reasonable expectation of success in doing so.” *PharmaStem Therapeutics, Inc. v. ViaCell, Inc.*, 491 F.3d 1342, 1360 (Fed. Cir. 2007) (citations omitted).

Obviousness is a determination of law based on underlying determinations of fact. *Star Scientific*, 655 F.3d at 1374. The factual determinations behind a finding of obviousness include: (1) the scope and content of the prior art, (2) the level and content of the prior art, (3) the differences between the claimed invention and the prior art, and (4) secondary considerations of non-obviousness. *KSR*, 550 U.S. at 399 (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966)). Secondary considerations of non-obviousness include commercial success, long felt but unresolved need, and the failure of others. *Id.* When present, secondary considerations “give light to the circumstances surrounding the origin of the subject matter sought to be patented,” but they are not dispositive on the issue of obviousness. *Geo. M. Martin Co. v. Alliance Mach. Sys. Int’l*, 618 F.3d 1294, 1304-06 (Fed. Cir. 2010). For evidence of secondary considerations to be given substantial weight in the obviousness determination, its proponent must establish a nexus between the evidence and the merits of the claimed invention. *See W. Union Co. v. MoneyGram Payment*

PUBLIC VERSION

Sys. Inc., 626 F.3d 1361, 1372-73 (Fed. Cir. 2010) (citing *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995)). “There is a presumption of nexus for [secondary] considerations when the patentee shows that the asserted [] evidence is tied to a specific product and that product is the invention disclosed and claimed in the patent.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1329 (Fed. Cir. 2016) (quotation marks and citation omitted).

3. Priority and Written Description

Section 112 of the Patent Act requires that all patent claims be supported by an enabling written description:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.

35 U.S.C. § 112(a).

In order for a patent to be entitled to priority based on an earlier application or chain of applications, “each application in the chain leading back to the earlier application must comply with the written description requirement of 35 U.S.C. § 112.” *Bradford Co. v. Conteyor N. Am., Inc.*, 603 F.3d 1262, 1269 (Fed. Cir. 2010) (citation omitted); 35 U.S.C. § 120. “In other words, the specification of the *provisional* must ‘contain a written description of the invention and the manner and process of making and using it, in such full, clear, concise, and exact terms’ . . . to enable an ordinarily skilled artisan to practice the invention *claimed* in the *non-provisional* application.” *New Railhead Mfg., L.L.C. v. Vermeer Mfg. Co.*, 298 F.3d 1290, 1294 (Fed. Cir. 2002) (emphasis original; internal citation omitted). “Entitlement to a filing date does not extend to subject matter which is not disclosed, but would be obvious over what is expressly disclosed.

PUBLIC VERSION

It extends only to that which is disclosed . . . all the limitations must appear in the specification.” *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1571-72 (Fed. Cir. 1997).

A patent is invalid for lack of written description under 35 U.S.C. § 112 if it does not “[c]learly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed.” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (citation omitted). “In other words, the test for sufficiency is whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Id.* Whether the inventor had “possession” of the claimed subject matter is determined by “an objective into the four corners of the specification from the perspective of a person of ordinary skill in the art.” *Id.* Thus, “a description that merely renders the invention obvious does not satisfy the [written description] requirement.” *Id.* at 1352. This inquiry is a question of fact. *Id.* at 1351.

A patentee’s “original disclosure serves to limit the permissible breadth of his later drafted claims.” *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1479 (Fed. Cir. 1998). The Federal Circuit has interpreted its *Gentry Gallery* opinion as expanding on the proposition that “a broad claim is invalid when the entirety of the specification clearly indicates that the invention is of a much narrower scope.” *Cisco Sys., Inc. v. Cirrex Sys., LLC*, 856 F.3d 997, 1008 (Fed. Cir. 2017) (citations omitted).

D. Domestic Industry

For a patent-based complaint, a violation of section 337 can be found “only if an industry in the United States, relating to the articles protected by the patent . . . concerned, exists or is in the process of being established.” 19 U.S.C. § 1337(a)(2). The complainant bears the burden of establishing that the domestic industry requirement is satisfied. *John Mezzalingua Assocs., Inc. v.*

PUBLIC VERSION

Int'l Trade Comm'n, 660 F.3d 1322, 1331 (Fed. Cir. 2011). The domestic industry requirement of section 337 is often described as having an economic prong and a technical prong. *InterDigital Commc'ns, LLC v. Int'l Trade Comm'n*, 707 F.3d 1295, 1298 (Fed. Cir. 2013); *Certain Stringed Musical Instruments and Components Thereof*, Inv. No. 337-TA-586, Comm'n Op. at 12-14, USITC Pub. No. 4120 (Dec. 2009).

1. Economic Prong

Section 337(a)(3) sets forth the following economic criteria for determining the existence of a domestic industry in such investigations:

(3) For purposes of paragraph (2), an industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the patent, copyright, trademark, mask work, or design concerned –

(A) significant investment in plant and equipment;

(B) significant employment of labor or capital; or

(C) substantial investment in its exploitation, including engineering, research and development, or licensing.

19 U.S.C. § 1337(a)(3). Because the statutory criteria are listed in the disjunctive, satisfaction of any one of them will be sufficient to meet the economic prong of the domestic industry requirement. *See InterDigital Commc'ns*, 707 F.3d at 1303 n.4; *Certain Variable Speed Wind Turbines and Components Thereof*, Inv. No. 337-TA-376, Comm'n Op. at 15, USITC Pub. No. 3003 (Nov. 1996).

2. Technical Prong

The technical prong of the domestic industry requirement is satisfied when the complainant in a patent-based section 337 investigation establishes that it is practicing or exploiting the patents at issue. *See* 19 U.S.C. § 1337(a)(2) and (3); *Certain Microsphere Adhesives, Process for Making*

PUBLIC VERSION

Same and Prods. Containing Same, Including Self-Stick Repositionable Notes, Inv. No. 337-TA-366, Comm'n Op. at 8, USITC Pub. No. 2949 (Jan. 1996). “The test for satisfying the ‘technical prong’ of the industry requirement is essentially [the] same as that for infringement, *i.e.*, a comparison of domestic products to the asserted claims.” *Alloc, Inc. v. Int’l Trade Comm’n*, 342 F.3d 1361, 1375 (Fed. Cir. 2003). To prevail, the patentee must establish by a preponderance of the evidence that the domestic product practices one or more valid claims of the patent. *See id.*; *Spanston*, 629 F.3d at 1349; *Certain Vision-Based Driver Assistance System Cameras and Components Thereof*, Inv. No. 337-TA-907, Comm’n Op. at 36, USITC Pub. No. 4866 (Feb. 2019). It is sufficient to show that the products practice any claim of that patent, not necessarily an asserted claim of that patent. *See Certain Male Prophylactic Devices*, Inv. No. 337-TA-546, Comm’n Op. at 38, USITC Pub. No. 4005 (May 2008).

E. Unclean Hands

The doctrine of unclean hands “is a self-imposed ordinance that closes the doors of a court of equity to one tainted with inequity or bad faith relative to the matter in which he seeks relief, however improper may have been the behavior of the defendant.” *Precision Instrument Mfg. Co. v. Auto. Maint. Mach. Co.*, 324 U.S. 806, 814 (1945). “[A] determination of unclean hands may be reached when ‘misconduct’ of a party seeking relief ‘has immediate and necessary relation to the equity that he seeks in respect of the matter in litigation,’ *i.e.*, ‘for such violations of conscience as in some measure affect the equitable relations between the parties in respect of something brought before the court.’” *Gilead Scis., Inc. v. Merck & Co.*, 888 F.3d 1231, 1239 (Fed. Cir. 2018), *cert. denied*, 139 S. Ct. 797 (2019) (quoting *Keystone Driller Co. v. General Excavator Co.*, 290 U.S. 240, 245 (1993)). This doctrine “‘necessarily gives wide range to the equity court’s use of discretion in refusing to aid the unclean litigant.’” *Id.* at 1239 (quoting

PUBLIC VERSION

Precision Instrument, 324 U.S. at 815). Section 337 specifies that “[a]ll legal and equitable defenses may be presented in all cases,” which includes the equitable unclean hands defense. *See* 19 U.S.C. § 1337(c); *Certain Integrated Circuit Devices and Prods. Containing the Same*, Inv. No. 337-TA-873, Order No. 35, 2013 WL 6355624, at *2 (USITC Nov. 19, 2013). A party asserting unclean hands “bears the burden of proving by clear and convincing evidence that [the opposing party] acted with unclean hands.” *In re Omeprazole Patent Litig.*, 483 F.3d 1364, 1374 (Fed. Cir. 2007).

VI. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art is a hypothetical person who is presumed to be aware of all pertinent prior art. *Custom Accessories, Inc. v. Jeffrey-Allan Industries, Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1992). Determining the appropriate level of skill for this hypothetical person can involve consideration of the types of problems encountered in the art, prior art solutions to those problems, rapidity with which innovations are made, sophistication of the technology at issue, the educational level of active workers in the field, and the level of education of the inventors themselves. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007).

Solaria and Canadian Solar generally agree that a person of ordinary skill in the art for the Asserted Patents would have 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. *See* CC Order at 7-8; CIB at 14; CX-0402C (Respondents’ 6th Supplemental Interrogatory Responses) at No. 10. I previously determined that the level of ordinary skill in the art shall be defined as agreed by the parties. CC Order at 8.

PUBLIC VERSION

VII. CLAIM CONSTRUCTION

I construed the disputed terms “ablation,” “laser beam to cause an ablation,” and “cut by an ablation from multiple passes of a laser beam” as part of the claim construction order issued as Order No. 7. *See* CC Order at 8-16. I hereby incorporate the discussion of those terms on pages 8-16 of Order No. 7 as part of this initial determination.

In my earlier order, I determined that the term “ablation” as used in the Asserted Patents “does not preclude the possibility of melting when the silicon is subjected to a laser.” CC Order at 10. I also stated that the term “ablation” “will construed according to its ordinary meaning in the art consistent with this explanation.” *Id.* at 11. The parties now dispute the ordinary meaning of “ablation” as that term is used in the Asserted Patents. *See, e.g.*, CIB at 14-17; RIB at 3-7. Solaria takes the position that “ablation” is “a general term for remov[ing] material using a laser,” whereas Canadian Solar asserts that the “ablation” claimed in the Asserted Patents is limited to using a laser to break chemical bonds within the silicon material in order to remove material. *See* CIB at 14-17; RIB at 3-7.

The record evidence demonstrates that a person of ordinary skill in the art would understand the term “ablation” to mean the removal of material using a laser. Solaria’s expert Dr. Banerjee testified convincingly that a person of ordinary skill would understand “ablation” in the context of the Asserted Patents to mean the laser removal of silicon from the kerf region. *See* Tr. (Banerjee) at 501:6-19.

Solaria adduced evidence showing that a person of ordinary skill would understand there are various mechanisms by which laser removal of silicon from the kerf region could be accomplished, including by melting and vaporization and by breaking the chemical bonds within the silicon. For example, a treatise chapter by Dowding and Borman teaches that “[a]blation is the

PUBLIC VERSION

principle [*sic*] means of material removal when using pulsed lasers” and that “[t]he energy absorbed by the target material converts the material to either a liquid that is expelled from the material through recoils or else a vapor, expelled through pressure.” CX-0195.0001; *see* Tr. (Banerjee) at 501:24-502:20.

Similarly, a master’s thesis written by Sisi Wang at the University of New South Wales on “Laser Technology in the Fabrication of High Efficiency Solar Cells” describes the various mechanisms involved in an ablation process. *See* CX-0031.0036; *see also* Tr. (Banerjee) at 502:25-503:20. Wang states that “[l]aser ablation is a general term describing the process of material removal by laser” and can involve multiple physical processes such as “material melting, vaporisation, sublimation, expulsion by recoil pressure, plasma formation, explosive boiling, hydrodynamic instability and the interaction of these phenomenon with the incident laser beam.” CX-0031.0036; *see also* CX-0031.0028 (“Ablation is a general term that describes material removal processes involving one to a few physical mechanisms.”). Dr. Banerjee explained that “hydrodynamic instability” refers to mechanical shockwaves and cavitation acting on a molten silicon layer to cause ejection of the silicon. *See* Tr. (Banerjee) at 503:21-504:4.

Even though the term “ablation” refers generally to the removal of material using a laser, Canadian Solar seeks to limit this term to the specific ablation mechanism “photoablation,” which refers to the direct breaking of chemical bonds. *See* RIB at 3-7. Canadian Solar in essence argues that, if material has been melted before it is removed from the solar cell kerfs at issue in this investigation, then that material has not been subject to an ablation. *See id.* This restrictive reading of the term is contrary to its ordinary meaning in the art and is not supported by the intrinsic evidence. Although the Asserted Patents discuss the advantages and disadvantages of different ablation mechanisms and the use of different laser powers, the inventors did not limit the “ablation”

PUBLIC VERSION

of their claimed invention to any one specific removal mechanism. *See, e.g.*, '388 patent at 11:61-12:16.

Canadian Solar's argument that the claimed ablation excludes the removal of melted or molten silicon relies on passages from the Asserted Patents stating, for example, that "ablation uses less energy to remove a volume of solar cell material than melting and vaporization, which occur at higher power levels," as well as a presentation slide (reproduced below) included with the provisional patent application. *See, e.g.*, RIB at 4-5 (citing '388 patent at 12:4-12 and JX-0012.0056 (provisional application slide)).

Laser Scribe Desirable Characteristics

- Scribe from the backside away from the PN junction
 - Reduces edge losses

- Scribe a narrow kerf
 - Remove as little material as possible
 - A narrow cut is more likely to cleave rather than crack the PV cell

- Scribe 50% (+/-10%) of the cell thickness^D
 - Allows for a clean cleave
 - Allows for cell thickness variation

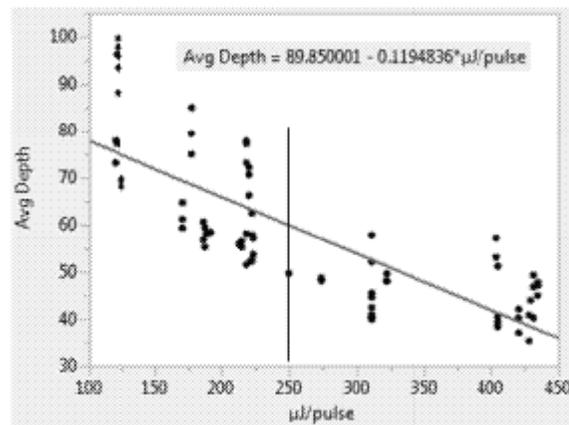
- Use a laser that ablates rather than melts the silicon
 - Keep the heat affected zone to a minimum
 - Reduces damage to the cell = keeps performance high

JX-0012.0056 (excerpt from presentation slide attached to the provisional application).

When viewed in context, the statements in the Asserted Patents describe a specific type of ablation occurring at lower power levels that limits the amount of material removed by a "melting

PUBLIC VERSION

and vaporization”—or boiling—process. See Tr. (Banerjee) at 506:10-507:8. As Dr. Banerjee explained while referring to Figure 41 of the '388 patent (reproduced below),⁵ the Asserted Patents describe how silicon material is removed from the kerf area by a continuum of ablation mechanisms that extend from a melting and vaporization process at one extreme to a non-boiling process at the other extreme. See Tr. (Banerjee) at 507:9-508:16.

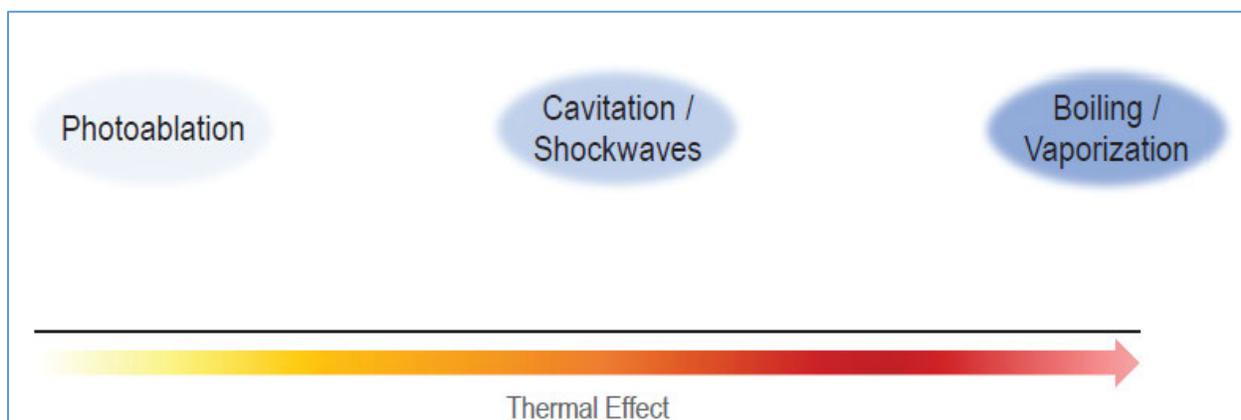


'388 patent Fig. 41

Dr. Banerjee illustrated this spectrum of ablation mechanisms in his demonstrative slide reproduced below:

⁵ Figure 41 also appears in identical form in the '333 patent.

PUBLIC VERSION



CDX-0003C.0051: Dr. Banerjee demonstrative slide

Tr. (Banerjee) at 504:5-505:17.

As for the provisional application description of “a laser that [a]blates rather than melts,” Dr. Banerjee testified convincingly that this bullet point explains that ablation requires silicon material to be ejected from the kerf, and that simple melting of the silicon without subsequent removal from the kerf would not be ablation. *See* Tr. (Banerjee) at 590:21-591:8; 610:16-611:5 (“melting alone isn’t sufficient for ablation”); *see also* Tr. (Gibson) at 385:5-9.

Canadian Solar argues that the ordinary meaning of “ablation” should not be applied in this investigation because it is at odds with the inventors’ use of the term in emails and other Solaria documents. *See* RIB at 6-7. This argument is not persuasive, as the extrinsic views of an inventor “cannot be relied on to change the meaning of the claims.” *Markman*, 52 F.3d at 983. Canadian Solar’s reliance on the Federal Circuit’s *Kaneka* opinion to support its claim construction position is equally unavailing because the facts at issue in *Kaneka* are distinguishable from the facts in this investigation. *See* RIB at 4, 6 (citing *Kaneka Corp. v. Xiamen Kingdomway Grp. Co.*, 790 F.3d 1298, 1304-05 (Fed. Cir. 2015)). In *Kaneka*, the district court relied on a dictionary definition to construe the term “sealed tank” in a way that excluded the preferred embodiment from the scope

PUBLIC VERSION

of the claims. *Kaneka Corp.*, 790 F.3d at 1304. This error led the Federal Circuit to reject the district court’s construction in favor of a construction that more closely aligned with the intrinsic evidence. *Id.* at 1304-05.

Here, the intrinsic evidence supports construing the term “ablation” according to its plain and ordinary meaning to a person of skill in the art. As discussed above in relation to Figure 41 of the ’388 patent, the Asserted Patents teach a spectrum of different removal mechanisms using a laser. Specifically, the Asserted Patents teach removing silicon material from the kerf using varying levels of a melting and vaporization process on one hand, and a non-boiling process on the other. *See, e.g.*, ’388 patent at 11:66-12:3, 12:4-12, Fig. 41; Tr. (Banerjee) at 507:9-508:16. As Dr. Banerjee testified, the left-hand side of Figure 41 does not exclude melting from the invention. Tr. (Banerjee) at 629:17-631:20. Even if the Asserted Patents limited the term “ablation” in some way, there is absolutely no intrinsic support for interpreting the term as requiring the direct breaking of chemical bonds as the sole mechanism of removal. Accordingly, Canadian Solar’s proposed construction is again rejected, as it was in my earlier claim construction order.

In sum, “ablation” is a general term known in the art that describes the removal of material using a laser. Restricting “ablation” to mean only photoablation or the direct breaking of chemical bonds is not supported by the intrinsic evidence. Although “ablation” undoubtedly encompasses photoablation and the direct breaking of chemical bonds, “ablation” can also encompass mechanisms such as melting and vaporization or melting followed by cavitation and/or shockwaves. I will apply the broad, ordinary understanding of “ablation”—“material removal using a laser”—in the analysis of the infringement, technical prong, and validity issues set forth in subsequent sections.

PUBLIC VERSION

VIII. INFRINGEMENT

For the reasons set forth below, I find that the Accused Products infringe claims 1-5, 8, 9, 11, 15-17, 19, and 20 of the '388 patent. I also find that Canadian Solar's manufacture of the Accused Products infringes claims 1, 8, 9, and 12-17 of the '333 patent.

A. The '388 Patent

Solaria asserts that Canadian Solar's HiDM CS1H, HiDM CS1H Black, and HiDM5 CS1Y modules infringe claims 1-5, 8, 9, 11, 15-17, 19, and 20 of the '388 patent. *See* Notice of Investigation; Order No. 9; Order No. 13; CIB at 6, 9-10. The parties have stipulated that the Accused Products satisfy all limitations of these claims except for the "cut by an ablation" limitation of claim 1 and the "repetition rate of between about 100-300 kHz" limitation of claim 20. *See* JX-0013 at 2, ¶ 8; *see also* Tr. at 533:6-16 (Canadian Solar's counsel agreeing that claim elements were satisfied); Tr. (Smith) at 892:7-893:5 (Canadian Solar's expert testifying that the Accused Products practice every limitation of claim 1 except for "cut by an ablation").

1. Claim 1

The parties stipulated, and Solaria adduced evidence to show, that the Accused Products satisfy many undisputed limitations of asserted claim 1 of the '388 patent. The following chart summarizes the record evidence with respect to the limitations of claim 1:

Claim Limitation	Testimony	Exhibit Evidence
An apparatus comprising:	Tr. (Banerjee) at 497:18-25	CPX-0006, CPX-0008, CPX-0009.
a solar module having a plurality of strings, each of the plurality of strings being configured in a parallel electrical arrangement with each other;	Tr. (Banerjee) at 498:1-15	CX-0121C, CX-0125C, CX-0040C, CX-0122C, CX-0041C; CX-0918C (Respondents' RFA responses) at No. 1.

PUBLIC VERSION

Claim Limitation	Testimony	Exhibit Evidence
a plurality of overlapped photovoltaic strips forming each of the plurality of photovoltaic strings separated from a solar cell, an edge of each of the overlapped photovoltaic strips comprising,	Tr. (Banerjee) at 498:16-499:5	CX-0909C, CPX-0038C, CX-0121C, CX-0040C, CX-0041C; CX-0918C (Respondents' RFA responses) at Nos. 2, 3.
a kerf in a back side of the strip having a depth of from 40% to 60% of a thickness of the solar cell and cut by an ablation from multiple passes of a laser beam, and	Tr. (Banerjee) at 499:6-500:6, 547:20-548:6	CX-0931C, CX-064C, CX-0073C, CX-0065C, CX-0074C; CX-0854C (Respondents' RFA responses) at No. 52
a crack extending from the kerf to a front side of the photovoltaic strip, the crack initiated by application of stress;	Tr. (Banerjee) at 548:9-20	CX-0931C
a first end termination configured along a first end of each of the plurality of strings; and a second end termination configured along a second end of each of the plurality of strings.	Tr. (Banerjee) at 548:21-549:9	CX-0121C, CX-0125C, CX-0040C, CX-0122C, CX-0041C, CX-0130C, CX-0858C (Respondents' RFA responses) at Nos. 137, 138, 140, 141, 143, 144, 146, 147.

See CIB at 27.

The sole dispute as to infringement of claim 1 is whether the Accused Products satisfy the “cut by an ablation” limitation. See RRB at 10-24. As explained above in Section VII, the plain and ordinary meaning of “ablation” applicable in this investigation is “material removal using a laser.” Under this construction of the term “ablation,” it is undisputed that the Accused Products infringe claim 1 of the '388 patent. See Tr. (Smith) at 893:6-14. Specifically, it is undisputed that lasers are used to remove solar cell material to manufacture the Accused Products. *Id.*

Accordingly, I find that the Accused Products infringe claim 1 of the '388 patent.

PUBLIC VERSION

2. Claims 2-5, 8, 9, 11, 15-17, 19, and 20

Asserted claims 2-5, 8, 9, 11, 15-17, 19, and 20 of the '388 patent all depend from claim 1. The record evidence shows that the Accused Products satisfy the additional limitations recited in these claims. For example, Dr. Banerjee testified that he analyzed “technical documents [and] operating procedures provided by Canadian Solar” and concluded that the Asserted Products practice these claims. Tr. (Banerjee) at 549:10-21, 549:22-550:7; *see also* CPX-0038C; CX-0867C (Liu Depo. Tr.) at 109:9-12, 139:20-22; CX-0901C (Xia Depo. Tr.) at 76:18-20, 84:18-20, 91:20-22, 95:4-9, 98:20-22; CX-0042C; CX-0044C; CX-0048C; CX-0049C; CX-0050C; CX-0061C; CX-0062C; CX-0065C.0008, .0024 (Autoway SOP); CX-0074C.0008, .0010, .0018 (Lead SOP); CX-0109C; CX-0113C; CX-0114C; CX-0115C; CX-0418C.0007 (HiDM5 Product Introduction presentation); CX-0909C.0003.

For claim 19, which recites the use of an infrared laser, Canadian Solar admits that the Accused Products are manufactured using an infrared laser. CX-0856C (Canadian Solar response to requests for admission) at Nos. 96, 101. The Accused Products therefore satisfy the additional limitation recited in claim 19.

Claim 20 recites the additional limitation “wherein the multiple passes of the laser beam comprise a repetition rate of between about 100-300 kHz.” Documents describing Canadian Solar’s standard operating procedures show that the Autoway and Lead lasers used to manufacture the Accused Products allow the user to adjust the frequency, or repetition rate, of the lasers from 250 to 550 kHz. *See* Tr. (Banerjee) at 550:3-24; CX-0065C.0008 (Autoway Operating Procedure); CX-0074C.0008 (Lead Operating Procedure). In addition, when Dr. Banerjee evaluated the laser parameters used with the Autoway equipment, he found them to be operating at 310 kHz, which he opined “is about the range of 100 to 300 kilohertz.” Tr. (Banerjee) at 550:3-24; CX-0109

PUBLIC VERSION

(Autoway laser parameters); CX-0901C (Xia Depo. Tr.) at 91:20-22. Canadian Solar does not dispute that the Accused Products satisfy this limitation. *See* RRB at 10-27. I therefore find the Accused Products satisfy the additional limitation recited in claim 20.

Canadian Solar does not dispute that the Accused Products satisfy any of the other limitations recited in dependent claims 2-5, 8, 9, 11, 15-17, 19, and 20 of the '388 patent. JX-0013 at 2, ¶ 8; RRB at 10-24.

Accordingly, I find that the Accused Products infringe claims 2-5, 8, 9, 11, 15-17, 19, and 20 of the '388 patent.

B. The '333 Patent

Solaria asserts that Canadian Solar infringes claims 1, 8, 9, 12, and 14-17 of the '333 patent in the manufacture of its HiDM CS1H, HiDM CS1H Black, and HiDM5 CS1Y modules. *See* Notice of Investigation; Order No. 9; Order No. 13; CIB at 8, 9-10. Solaria also asserts that Canadian Solar infringes claim 13 of the '333 patent in the manufacture of its HiDM CS1H and HiDM CS1H Black modules. *See* CIB at 8, 9-10.

The parties have stipulated that manufacture of the Accused Products involves performance of most of the steps of these claims. JX-0013 at 2, ¶ 7. The parties only dispute whether the laser scribing process involves an ablation (claim 1), whether the process removes and captures vaporized material (claim 1), whether the process involves solar cells that are 156 mm +/- 2 mm (claim 13), and whether the laser has a repetition rate of between about 100-300 kHz (claim 17). *See id.*

1. Claim 1

The parties stipulated, and Solaria adduced evidence to show, that Canadian Solar practices many undisputed limitations of claim 1 of the '333 patent when it manufactures the Accused

PUBLIC VERSION

Products. The following chart summarizes the record evidence with respect to the limitations of claim 1:

Claim Limitation	Testimony	Exhibit Evidence
A method comprising:	Tr. (Banerjee) at 552:7-13	CX-0061C; CX-0062C; CX-0064C; CX-0065C; CX-0073C; CX-0074C
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	Tr. (Banerjee) at 552:14-553:2	CX-0062C; CX-0061C; CX-0023; CX-0024; CX-0067; CX-0042C; CX-0046C; CX-0867C (Liu Depo. Tr.) (testifying as to back side metal paste); CX-0918C (Respondents' RFA Responses) at No. 8
placing the front side of the solar cell on a platen such that the backside is facing a laser source	Tr. (Banerjee) at 553:4-11	CX-0065C; CX-0074C; CX-0080; CPX-0030; CX-0918C (Respondents' RFA Responses) at No. 9
initiating a laser source to output a laser beam	Tr. (Banerjee) at 553:12-21	CX-0065C; CX-0074C; CPX-0030; CX-0055C; CX-0080; CX-0918C (Respondents' RFA Responses) at No. 10
subjecting a portion of the backside to the laser beam at least twice to cause an ablation to form a scribe region having a depth, width, and a length	Tr. (Banerjee) at 553:22-554:20	CX-0211; CX-0934C; CX-0065C; CPX-0030; CX-0074C
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;	Tr. (Banerjee) at 554:21-555:4	CX-0931C; CX-0064C; CX-0073C
removing a vaporized material from a vicinity of the ablation; and capturing the vaporized material using a vacuum	Tr. (Banerjee) at 555:5-559:1	CPX-0030; CX-0065C; CX-0080; CX-0074C

See CIB at 52-53.

PUBLIC VERSION

In addition to the evidence summarized in the chart above, Canadian Solar engineer Mr. Liu testified that Canadian Solar scribes solar cells from their backside to a depth of 40-60% of the cell thickness with multiple passes of the laser beam. CX-0867C (Liu Depo. Tr.) at 44:14-45:2, 45:11-46:4, 64:3-6, 87:10-18.

With respect to infringement of claim 1 of the '333 patent, the parties dispute only whether Canadian Solar uses a “laser beam . . . to cause an ablation to form a scribe region,” “remov[es] a vaporized material from a vicinity of the ablation,” and “captur[es] the vaporized material using a vacuum.” JX-0013 at 2, ¶ 7. As explained above in Section VII, the plain and ordinary meaning of “ablation” applicable in this investigation is “material removal using a laser.” Under this construction of the term “ablation,” it is undisputed that Canadian Solar uses a “laser beam . . . to cause an ablation to form a scribe region” because Canadian Solar uses lasers to remove solar cell material to manufacture the Accused Products. *See, e.g.*, CX-0867C (Liu Depo. Tr.) at 44:14-45:2, 45:11-46:4, 64:3-6, 87:10-18.

As for the disputed “removing” and “capturing” limitations, the record evidence shows that the Autoway and Lead equipment used by Canadian Solar include vacuum chambers located to the side of the solar cell. CPX-0030; CX-0065C; CX-0080; CX-0074C. These vacuum chambers are powerful enough to pull debris and other ejected material away from the solar cell during the laser scribing process and capture that material. *See* Tr. (Banerjee) at 555:5-557:11. Canadian Solar’s engineer Mr. Liu testified that, “after the silicon powder is cut away from the solar cell using the Autoway equipment, it’s pulled into the dust collecting device.” CX-0867C (Liu Depo. Tr.) at 74:10-14. Mr. Liu also testified that the Lead equipment is “used to suck away dust created during the laser scribing” and that there “would be some air flow generated by the suction down at the left-hand side.” CX-0867C (Liu Depo. Tr.) at 93:15-94:7, 95:9-96:18.

PUBLIC VERSION

Canadian Solar disputes that its manufacture of the Accused Products using Autoway and Lead equipment satisfies the “removing” and “capturing” limitations. *See* RRB at 24-27. Canadian Solar argues that, because claim 1 contains one clause that describes removing vaporized material and another clause that describes capturing the vaporized material, infringement cannot be found unless there are two separate machines or structures performing these steps. *See id.*; *see also* Tr. (Smith) at 885:9-19; 885:21-886:24. This argument contradicts the legal principle that infringement of a method claim requires only that all recited steps are performed and does not necessarily require that they are performed serially in time or by a particular apparatus. *Tilghman v. Proctor*, 102 U.S. 707, 730 (1880) (a process patent claim is not confined to the particular apparatus described in the patent for carrying the process into effect); *Moba, B.V. v. Diamond Automation, Inc.*, 325 F.3d 1306, 1314 (Fed. Cir. 2003) (rejecting a construction of a method claim that would require “separate and consecutive performance” of the recited steps where the language of the claim had no such requirement). Indeed, Canadian Solar cites no case law in support of its flawed legal theory. *See* RRB at 24-27.

In view of the record evidence discussed above, I find that Canadian Solar infringes claim 1 of the ’333 patent when it manufactures the Accused Products.

2. Claims 8, 9, and 12-17

Asserted claims 8, 9, and 12-17 of the ’333 patent all depend from claim 1. The record evidence shows that Canadian Solar’s manufacture of the Accused Products satisfy the additional limitations recited in these claims.⁶ For example, Dr. Banerjee testified that he analyzed “technical

⁶ Claim 13 is asserted only as to Canadian Solar’s manufacture of the HiDM CS1H and HiDM CS1H Black modules; claims 8, 9, 12, and 14-17 are asserted as to Canadian Solar’s manufacture of all Accused Products. *See* CIB at 9-10.

PUBLIC VERSION

documents and operating procedures provided by Canadian Solar” and concluded that Canadian Solar practices these claims. Tr. (Banerjee) at 559:2-12; *see also* CX-0867C (Liu Depo. Tr.) at 109:9-12, 136:21-137:7, 139:20-22; CX-0901C (Xia Depo. Tr.) at 84:18-20, 91:20-22, 95:4-9, 98:20-22; CX-0025C.0002; CX-0042C; CX-0044C; CX-0045C; CX-0046C; CX-0047C; CX-0048C; CX-0049C; CX-0050C; CX-0054C.0005, .0012; CX-0062C; CX-0065C.0008; CX-0074C.0008; CX-0109C; CX-0119C.

Claim 13 adds a limitation that the scribe region of claim 1 must have a length of “156 mm+/-2 mm.” Drawings of Canadian Solar’s HiDM CS1H and HiDM CS1H Black modules demonstrate they have a length of 156.75 millimeters; Canadian Solar’s manufacture of its HiDM CS1H and HiDM CS1H Black modules therefore satisfy this limitation. *See* Tr. (Banerjee) at 560:3-20; CX-0042C.

Claim 17 recites the additional limitation “wherein subjecting the portion of the backside to the laser beam comprises applying the laser beam at a repetition rate of between about 100-300 kHz.” As explained in Section VIII.A.2 with respect to claim 20 of the ’388 patent, Canadian Solar’s manufacture of the Accused Products satisfy this limitation. *See* Tr. (Banerjee) at 560:21-561:20; CX-0065C.0008 (Autoway Operating Procedure); CX-0074C.0008 (Lead Operating Procedure); CX-0109 (Autoway laser parameters).

Canadian Solar does not dispute that it practices the additional limitations recited in dependent claims 8, 9, and 12-17 of the ’333 patent when it manufactures the Accused Products. JX-0013 at 2, ¶ 7; RRB at 10-27.

Accordingly, I find that Canadian Solar infringed claims 8, 9, and 12-17 of the ’333 patent when it manufactured the Accused Products.

PUBLIC VERSION

IX. TECHNICAL PRONG OF THE DOMESTIC INDUSTRY REQUIREMENT

For the reasons set forth below, I find that the Domestic Industry Products practice claims 1, 2-5, 8, 11, 13, 14, 17, and 20 of the '388 patent. I also find that Solaria's manufacture of the Domestic Industry Products practices claims 1-3, 6, 8, 9, 12, 14, and 15-17 of the '333 patent.

A. The '388 Patent

Solaria asserts that all Domestic Industry Products practice claims 1-5, 8, 11, 13, 14, 17, and 20 of the '388 patent. *See* CIB at 37. Solaria also asserts that Domestic Industry Products made using an AMAT laser practice claim 19 of the '388 patent.⁷ *See id.*

The parties have stipulated that Domestic Industry Products made using Genesem equipment practice all '388 Asserted Domestic Industry Claims. JX-0013 at 2, ¶ 11. The parties have also stipulated that Domestic Industry Products made using AMAT equipment practice all limitations of the '388 Asserted Domestic Industry Claims except for the "cut by an ablation" limitation recited in claim 1. *See* JX-0013 at 2-3, ¶ 14.

1. Claim 1

The parties stipulated, and Solaria adduced evidence to show, that the Domestic Industry Products practice many undisputed limitations of claim 1 of the '388 patent. The following chart summarizes the record evidence with respect to the limitations of claim 1:

Claim Limitation	Testimony	Exhibit Evidence
An apparatus comprising:	Tr. (Banerjee) at 565:16-24	CX-0256, CX-0257, CX-0258, CX-0259

⁷ Solaria did not identify claim 19 as a claim on which it relies to prove satisfaction of the technical prong of the domestic industry requirement. *See* CIB at 8 (identifying '388 Domestic Industry Claims). Nevertheless, Solaria did identify claim 19 as a '388 Domestic Industry Claim in its prehearing brief and adduced relevant evidence at the hearing. I will therefore make a factual finding as to whether the technical prong is satisfied with respect to claim 19 of the '388 patent.

PUBLIC VERSION

Claim Limitation	Testimony	Exhibit Evidence
a solar module having a plurality of strings, each of the plurality of strings being configured in a parallel electrical arrangement with each other;	Tr. (Banerjee) at 565:25-566:8	CX-0225C, CX-0162C, CX-0255, CX-0258, CX-0257, CX-0259, CX-0256
a plurality of overlapped photovoltaic strips forming each of the plurality of photovoltaic strings separated from a solar cell, an edge of each of the overlapped photovoltaic strips comprising,	Tr. (Banerjee) at 566:9-19	CX-0168C, CX-0163C, CX-0219C, CX-0219C, CX-0282C
a kerf in a back side of the strip having a depth of from 40% to 60% of a thickness of the solar cell and cut by an ablation from multiple passes of a laser beam, and	Tr. (Banerjee) at 566:20-567:13	CX-0931C, CX-0150C, CX-0216C, CPX-0286C, CX-0151C, CPX-0212C, CX-0215C
a crack extending from the kerf to a front side of the photovoltaic strip, the crack initiated by application of stress;	Tr. (Banerjee) at 575:19-576:6	CX-0931C, CPX-0149C, CPX-0147C, CX-0224C, CX-0282C
a first end termination configured along a first end of each of the plurality of strings; and a second end termination configured along a second end of each of the plurality of strings.	Tr. (Banerjee) at 576:7-14	CX-0225C, CX-0168C, CX-0219C, CX-0255, CX-0258, CX-0257, CX-0259, CX-0256

See CIB at 37-38.

The sole dispute as to claim 1 is whether the Domestic Industry Products made using AMAT equipment practice the “cut by an ablation” limitation. See RRB at 28-30. As explained above in Section VII, the plain and ordinary meaning of “ablation” applicable in this investigation is “material removal using a laser.” Under this construction of the term “ablation,” the evidence shows the Domestic Industry Products made using AMAT equipment practice claim 1 of the ’388 patent. See Tr. (Smith) at 892:7-894:4 (conceding that PowerXT modules made on AMAT

PUBLIC VERSION

equipment would practice claim 1 if “ablation” were defined to mean “material removal using a laser”).

Accordingly, I find that all Domestic Industry Products practice claim 1 of the ’388 patent.

2. Claims 2-5, 8, 11, 13, 14, 17, and 20

Claims 2-5, 8, 11, 13, 14, 17, and 20 of the ’388 patent all depend from claim 1. Canadian Solar does not dispute that all Domestic Industry Products practice the additional limitations recited in these dependent claims. JX-0013 at 2-3, ¶¶ 11, 14.

I therefore find that all Domestic Industry Products practice claims 2-5, 8, 11, 13, 14, 17, and 20 of the ’388 patent.

3. Claim 19

The evidence shows that the AMAT laser is an infrared laser. CX-0216C.0017; CX-0357C.0028. I therefore find that Domestic Industry Products made using AMAT equipment practice claim 19 of the ’388 patent.

B. The ’333 Patent

Solaria asserts that it practices claims 1, 2, 3, 8, 9, 12, 14, and 17 of the ’333 patent when it manufactures each of the Domestic Industry Products. *See* CIB at 55. Solaria also asserts that it practices claims 6, 15, and 16 of the ’333 patent when it manufactures its PowerXT products using Genesem equipment. *See id.* In addition, Solaria asserts that it practices claim 13 of the ’333 patent in the manufacture of its 300 Series PD and AC modules.⁸ *See id.*

⁸ Solaria did not identify claim 13 as a claim on which it relies to prove satisfaction of the technical prong of the domestic industry requirement. *See* CIB at 9 (identifying ’333 Domestic Industry Claims). Nevertheless, Solaria did identify claim 13 as a ’333 Domestic Industry Claim in its prehearing brief and adduced relevant evidence at the hearing. I will therefore make a factual finding as to whether the technical prong is satisfied with respect to claim 13 of the ’333 patent.

PUBLIC VERSION

The parties have stipulated that Solaria practices all '333 Domestic Industry Claims in the manufacture of Domestic Industry Products using Genesem equipment. *See* JX-0013 at 2, ¶ 10; *see also* RRB at 29 (Canadian Solar representing that “[b]oth parties posit that Solaria’s Genesem equipment practices the Asserted Patents”). The parties have also stipulated that when Solaria manufactures Domestic Industry Products using AMAT equipment, it practices all limitations of the '333 Domestic Industry Claims except for the “cause an ablation to form a scribe region” limitation recited in claim 1. *See* JX-0013 at 2, ¶ 13.

1. Claim 1

The parties stipulated, and Solaria adduced evidence to show, that Solaria practices many undisputed limitations of claim 1 of the '333 patent when it manufactures the Domestic Industry Products. The following chart summarizes the record evidence with respect to the limitations of claim 1:

Claim Limitation	Testimony	Exhibit Evidence
A method comprising:	Tr. (Banerjee) at 578:17-24	CX-0258; CX-0384; CX-0139; CX-0140; CX-0141
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	Tr. (Banerjee) at 578:25-579:17	CX-0258; CX-0384; CX-0139; CX-0140; CX-0141
placing the front side of the solar cell on a platen such that the backside is facing a laser source	Tr. (Banerjee) at 579:18-25	CX-0152C; CX-0216C; CX-0153C
initiating a laser source to output a laser beam	Tr. (Banerjee) at 580:1-7	CX-0153C; CX-0150C; CX-0151C; CX-0152C; CX-0216C

PUBLIC VERSION

Claim Limitation	Testimony	Exhibit Evidence
subjecting a portion of the backside to the laser beam at least twice 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;	Tr. (Banerjee) at 580:8-581:10	CX-0931C; CPX-0148C; CX-0150C; CX-0216C; CPX-0286C
removing a vaporized material from a vicinity of the ablation; and capturing the vaporized material using a vacuum	Tr. (Banerjee) at 581:11-17	CX-0153C

See CIB at 55-56.

The sole dispute as to claim 1 is whether manufacturing the Domestic Industry Products using AMAT equipment includes causing “an ablation to form a scribe region.” *See* RRB at 28-30. As explained above in Section VII, the plain and ordinary meaning of “ablation” applicable in this investigation is “material removal using a laser.” Under this construction of the term “ablation,” the evidence shows that Solaria practices claim 1 of the ’333 patent when it uses AMAT equipment to manufacture each of the Domestic Industry Products. *Cf. See* Tr. (Smith) at 892:7-894:4 (all Domestic Industry Products are made by causing “an ablation” if “ablation” were defined to mean “material removal using a laser”).

Accordingly, I find that Canadian Solar practices claim 1 of the ’333 patent when it uses Genesem equipment and when it uses AMAT equipment to manufacture the Domestic Industry Products.

PUBLIC VERSION

2. Claims 2, 3, 6, 8, 9, 12, 14, and 15-17

Claims 2, 3, 6, 8, 9, 12, 14, and 15-17 of the '333 patent all depend from claim 1. Canadian Solar does not dispute that Solaria practices the additional limitations recited in these dependent claims in the manufacture of all Domestic Industry Products. JX-0013 at 2, ¶¶ 10, 13.

I therefore find that Solaria practices claims 2, 3, 6, 8, 9, 12, 14, and 15-17 of the '333 patent when it uses Genesem equipment and when it uses AMAT equipment to manufacture the Domestic Industry Products.

3. Claim 13

Claim 13 depends from claim 1. Dr. Banerjee testified that he analyzed Solaria's PowerXT 300 Series PD and AC DI Products and found Solaria practices claim 13 in the manufacture of these products. Tr. (Banerjee) at 582:11-583:5; *see also* CX-0168C (cell drawing) at 2 (length of "156.75 +/- 0.25"). Canadian Solar does not dispute that Solaria practices claim 13. *See* RRB at 28-30. I therefore find that Solaria practices claim 13 of the '333 patent when it uses Genesem equipment and when it uses AMAT equipment to manufacture the PowerXT 300 Series PD and AC Domestic Industry Products.

X. ECONOMIC PRONG OF THE DOMESTIC INDUSTRY REQUIREMENT

Solaria asserts that it satisfies the economic prong of the domestic industry requirement under U.S.C. § 1337(a)(3) subsections (A) and (B). Solaria contends that it "has invested, and continues to invest, in plant and equipment and labor and capital made in support of [research and development], engineering, and technical support/testing activities related to" the Domestic Industry Products. CIB at 60; *see also id.* at 60-71.

PUBLIC VERSION

A. Solaria's Domestic Activities

Solaria adduced evidence to show it began the research and development process for the Power XT modules in September 2014 and began commercially manufacturing the PowerXT panels in late 2016. *See* Tr. (Sharma) at 48:20-49:2, 50:20-24, 55:6-11, 130:22-25; Tr. (Gibson) at 224:13-16. Since then, Solaria has sold the PowerXT modules in three different wattage classes ranging from 330W to 400W. Tr. (Sharma) at 50:20-52:1, 53:17-20. Solaria began working on the 400W product three years ago and is currently in the process of sunsetting the 300W products. Tr. (Sharma) at 51:8-22, 53:21-54:12. Solaria is also working on a new PowerXT module that uses [REDACTED] cells. *See* Tr. (Sharma) at 60:16-61:24, 96:6-97:9. Solaria alleges that these new PowerXT modules will practice the Asserted Patents. *Id.*

Solaria primarily sells its PowerXT products in the residential market. Tr. (Sharma) at 47:3-48:19, 52:4-11, 89:13-19. Between 2017 and September 15, 2020, the Domestic Industry Products accounted for between 94% and 96% of Solaria's total worldwide revenue, which ranged from about [REDACTED] in 2017 to nearly [REDACTED] in 2020. *See* Tr. (Mulhern) at 704:4-18; Tr. (Sharma) at 82:24-83:3; CX-0935C (2016 income statement); CX-0588C (2017 income statement); CX-0589C (2018 income statement); CX-0590C (2019 income statement); CX-0678C (2020 and 2021 preliminary annual operating plan). Of that revenue, approximately [REDACTED] is from U.S. sales. RX-0103C (Sharma Depo. Tr.) at 300:17-301:4; Tr. (Mulhern) at 704:4-18.

The record evidence shows that Solaria conducts its research and development and engineering activities exclusively within the United States. Tr. (Sharma) at 69:6-70:18, 82:8-17; CPX-0690C. At its domestic research and development facility, Solaria conducts activities related to product design and development, manufacturing process development, testing of the Domestic

PUBLIC VERSION

Industry Products, and development of future products. Tr. (Sharma) at 60:16-61:24; Tr. (Banerjee) at 584:3-586:2.

1. Solaria's R&D and Engineering Activities

Solaria employs approximately 20 people in the United States to conduct research and development for the Domestic Industry Products. Tr. (Sharma) at 54:22-23, 55:6-11; CPX-0712C (Updated Employee Spreadsheet); CPX-0633C (Employee Spreadsheet); RX-0103C (Sharma Depo. Tr.) at 291-92, 311-12. These U.S. R&D employees have worked with two equipment manufacturers—Genesem and AMAT—to design equipment and develop manufacturing processes to manufacture the Domestic Industry Products. Tr. (Sharma) at 94:14-23, 114:25-115:122; CPX-0631C.

Solaria contracts with a company in South Korea called SolarPark for the manufacture of the Domestic Industry Products. The equipment used to produce the Domestic Industry Products consists of specialized “front-end” equipment that includes “the core shingling equipment, solar cell scribing singulation, [and] stringing layout” equipment, as well as standard “back-end” equipment used for producing solar panels generally. *See* Tr. (Sharma) at 93:10-94:1. Solaria [REDACTED] located in the SolarPark facilities, and SolarPark [REDACTED] [REDACTED]. Tr. (Sharma) at 93:10-94:1; CX-0659C.0001, .0006 (SolarPark TLA); RX-0103C (Sharma Depo. Tr.) at 156:17-157:12; 196:9-20. SolarPark uses the equipment and processes designed by Solaria to manufacture Solaria's PowerXT panels to Solaria's specifications, and SolarPark uses Solaria's front-end equipment to produce shingled solar panels exclusively for Solaria. *Id.*; Tr. (Sharma) at 91:14-19, 93:10-94:5. Solaria pays SolarPark [REDACTED] for the modules SolarPark makes. Tr. (Sharma) at 94:2-5; RX-0103C (Sharma Depo. Tr.) at 180:8-21; CX-0711C (Solaria Forecast).

PUBLIC VERSION

In 2015 and 2016, Solaria employees located in the United States worked with laser supplier Genesem to develop front-end equipment and a manufacturing line to produce the Domestic Industry Products. *See* Tr. (Sharma) at 115:23-116:11; Tr. (Mulhern) at 708:9-22; RX-0103C (Sharma Depo. Tr.) at 118, 156, 170, 206-07; RX-0179C (Gibson Depo. Tr.) at 63-63, 86. Solaria purchased the Genesem laser equipment in 2016 and installed this equipment at SolarPark. Tr. (Sharma) at 172:6-23; Tr. (Mulhern) at 708:9-22; JX-0013 at 2, ¶ 12. SolarPark used this equipment to produce Domestic Industry Products for Solaria until August 2020. *Id.*

From approximately 2017 to 2020, Solaria employees located in the United States worked with laser supplier AMAT to develop front-end equipment and a customized production line for manufacturing the Domestic Industry Products. *See* Tr. (Sharma) at 115:8-11; 116:23-117:8. The development of the AMAT-based production line leveraged the knowledge and experience Solaria gained from its earlier collaboration with Genesem. *See* Tr. (Sharma) at 117:9-20; Tr. (Mulhern) at 709:4-20. As of the third quarter of 2020, Solaria had transitioned all of its production from using Genesem equipment to using AMAT equipment. Tr. (Sharma) at 115:12-22; JX-0013 at 3, ¶¶ 15-16.

Solaria's domestic research and development work also focuses on "sustaining engineering" efforts for its existing products, which involve developing improvements and qualifying additional material suppliers. Tr. (Sharma) at 60:16-61:24; RX-0103C (Sharma Depo. Tr.) at 312. For example, for Solaria's 400W-series Domestic Industry Products, Solaria's research and development efforts include designing the mechanical and electrical systems for the products, developing and building prototypes, and testing and certifying the products. Tr. (Sharma) at 53:21-54:21; RX-0103C (Sharma Depo. Tr.) at 313-15.

PUBLIC VERSION

Solaria's founder Mr. Sharma testified that some of Solaria's current research and development work relates to integrating recently developed [REDACTED] solar cells into the Domestic Industry Products. RX-0103C (Sharma Depo. Tr.) at 298-99. Solaria asserts that these [REDACTED] modules will be laser scribed, shingled solar modules that will practice the Asserted Patents. *See* Tr. (Banerjee) at 584:3-586:2; Tr. (Sharma) at 60:16-61:24, 96:6-97:9; RX-0103C (Sharma Depo. Tr.) at 298-99; Tr. (Mulhern) at 703:11-704:3.

2. Solaria's Testing Activities

The record evidence shows that Solaria performs reliability and performance testing for the Domestic Industry Products at its U.S. facilities and through its U.S.-based third-party contractors. Tr. (Sharma) at 60:16-61:24, 66:9-25, 76:13-77:21, 81:18-82:17; CPX-0635C (Solaria Expenditures); Tr. (Mulhern) at 710:11-17, 712:12-21, 719:21-720:25; CPX-0713C (Q3 2020 Income Statement); RX-0103C (Sharma Depo. Tr.) at 33, 318, 322. Reliability testing, which is performed by Solaria and its third-party contractors, involves environmental tests such as thermal cycling tests. Tr. (Sharma) at 76:13-77:21. Performance testing, which is mostly performed by Solaria itself, involves measuring power outputs. *Id.*

B. Solaria's Domestic Expenditures

Solaria adduced evidence to show that, between 2017 and September 15, 2020, Solaria invested approximately [REDACTED], net government grant-related funds,⁹ on labor and capital and plant and equipment related to the Domestic Industry Products within the United States. *See* Tr.

⁹ Solaria's economic expert Ms. Mulhern testified that she understood the government grant totaling [REDACTED] offset some of the costs of Solaria's research and development. Tr. (Mulhern) at 725:19-726:6. Ms. Mulhern's removal of the amount of the grant funding from her analysis of Solaria's domestic expenditures was intended to provide a conservative estimate of only Solaria's investments, as opposed to including investments made by the government. Tr. (Mulhern) at 725:19-726:6, 759:7-760:16.

PUBLIC VERSION

(Mulhern) at 725:4-18. Solaria also adduced evidence to show that, between 2018 and September 15, 2020, Solaria's domestic investments in labor and capital and plant and equipment comprised [REDACTED]. *See* Tr. (Mulhern) at 725:4-18.

Canadian Solar disputes whether *all* of Solaria's allocated expenditures for the Domestic Industry Products should be considered in this investigation. Specifically, Canadian Solar has argued that the Domestic Industry Products manufactured using AMAT-supplied lasers do not practice the Asserted Patents and that therefore any investments in those modules should not be counted towards satisfaction of the economic prong. *See* RRB at 57-58. As discussed above in Section IX, I have determined that all Domestic Industry Products—those made with Genesem lasers and those made with AMAT lasers—practice the Asserted Patents. Accordingly, all of Solaria's domestic investments as to the Domestic Industry Products, summarized below, are properly considered as part of the economic prong analysis.

1. Plant and Equipment

Solaria adduced evidence to show that it invested a total of approximately [REDACTED] in plant and equipment related to the design and development of the Domestic Industry Products. This amount includes investments in facilities and equipment used for research and development activities allocable to the Domestic Industry Products. *See* Tr. (Mulhern) at 724:14-725:3; *see* CDX-0004C.25; CDX-0024C (Mulhern Revised Ex. 14).

a) Facilities

Since November 2019, Solaria has maintained a 22,847 square foot headquarters facility located at 45700 Northport Loop East, Fremont, California, where it engages in research and development and testing related to the Domestic Industry Products. Tr. (Sharma) at 56:9-18, 59:9-62:9; RX-0103C (Sharma Depo. Tr.) at 318-19; CX-0663C.0002, .0035 (45700 Northport

PUBLIC VERSION

Lease); CX-0662C (Lease Counter Proposal). Approximately 29% of this facility (6,600 square feet) is used to conduct activities related to research and development, design, and testing; this portion of the facility includes test equipment, prototyping equipment, and the research and development line, and conservatively excludes office space. Tr. (Sharma) at 59:22-60:10; Tr. (Mulhern) at 710:20-711:21; RX-0103C (Sharma Depo. Tr.) at 318-21; CX-0663C.0035; CX-0662C; *see* CDX-0004C.11; CDX-0025C (Rev'd Ex. 8 to Mulhern Rpt.).

From January 2017 through November 2019, Solaria subleased a 15,523 square foot facility at 6200 Paseo Padre Boulevard in Fremont, California. Tr. (Sharma) at 56:19-23, 62:10-66:16, 64:14-66:7; Tr. (Mulhern) at 711:24-712:21; CX-0668C.0001 (Second Amendment to Lease); CX-0667C (First Amendment to Lease); CX-0665C (Equipment Plan); RX-0103C at 319; CDX-0025C (Revised Ex. 8 to Mulhern Rpt.). Solaria used approximately 55% of this facility (8,600 square feet) to conduct activities related to research and development and testing of the Domestic Industry Products. *Id.*

Solaria used the two facilities in Fremont described above to develop the Domestic Industry Products and to develop the manufacturing processes related to these products. Tr. (Sharma) at 59:22-60:10; Tr. (Mulhern) at 710:20-712:21; RX-0103C (Sharma Tr.) at 318-21; *see* CDX-0004C.11-14. Solaria's facilities also included equipment used for making prototypes and finished modules, such as scribes, singulators, stringers, laminators, and flash testers, as well as test equipment used for performance, reliability, and durability testing. Tr. (Sharma) at 66:9-25; Tr. (Mulhern) at 712:12-21.

Ms. Mulhern analyzed Solaria's facilities using a sales-based allocation and concluded that, from 2017 to 2020, Solaria spent [REDACTED] on facility rental expenses and associated facility operating expenses allocable to research and development activities. Tr. (Mulhern) at

PUBLIC VERSION

721:15-723:12, 716:10-717:5; CX-0662C.0001-.0002 (Lease Counter Proposal); CX-0668C.0001 (Second Amendment to Lease); CX-0669C.0001-.0002 (Sublease Agreement); CX-0663C.0035 (45700 Northport Lease); *see* CDX-0004C.23 (Mulhern Demonstratives); CDX-0025C (Rev'd Ex. 8 to Mulhern Rpt.).

b) Facilities and Equipment Maintenance

The evidence shows that Solaria invests in maintenance of its domestic facilities and equipment used in the development and testing of the Domestic Industry Products. Tr. (Sharma) at 67:1-22; RX-0103C (Sharma Depo. Tr.) at 318. Using a sales-based allocation, Ms. Mulhern concluded that Solaria invested [REDACTED] on maintenance for facilities and equipment used in developing and testing the Domestic Industry Products from January 2017 through September 15, 2020. Tr. (Mulhern) at 723:13-724:13; CPX-0635C (Solaria Expenditures); CPX-0713C (Solaria Q3 2020 Income Statement); RX-0103C (Sharma Tr.) at 318; *see* CDX-0004C.24 (Mulhern Demonstratives); CDX-0019C.120 (Ex. 9 to Mulhern Rpt.).

2. Labor and Capital

Solaria adduced evidence to show that it invested a total of approximately [REDACTED] in domestic labor and capital between 2017 and September 2020 for work on the Domestic Industry Products. *See* Tr. (Mulhern) at 721:1-14; CDX-0004C.22 (Mulhern Demonstratives); CDX-0024C (Mulhern Revised Ex. 14).

a) Labor

Between January 2017 and September 15, 2020, Solaria had between 17 and 22 employees based in the United States who were dedicated solely to research and development activities associated with the Domestic Industry Products. Tr. (Sharma) at 54:22-23, 55:6-11; CPX-0712C (Updated Employee Spreadsheet); CPX-0633C (Employee Spreadsheet); RX-0103C (Sharma

PUBLIC VERSION

Depo. Tr.) at 291-92, 311-12. At this time, Solaria also had two full-time equivalent employees who supported research and development of the Domestic Industry Products. Tr. (Mulhern) at 713:1-714:8; Tr. (Sharma) at 55:12-16; CPX-0712C; CPX-0633C; *see* CDX-0004C.15 (Mulhern Demonstratives); CDX-0019C.0121-122 (Ex. 10 to Mulhern Rpt.).

Ms. Mulhern analyzed Solaria's salary expenditures and concluded that, from 2017 to 2020, Solaria invested [REDACTED] towards salary, benefits, taxes, and other expenses for employees engaged in research and development activities for the Domestic Industry Products. *See* CDX-0019C.0121-122 (Ex. 10 to Mulhern Rpt.); CPX-0712C; CPX-0633C.

Canadian Solar disputes Solaria's allocation of labor expenditures for its Domestic Industry Products. *See* RRB at 58-60. Canadian Solar argues that Solaria's labor expenditures are "unreliable and likely overstated" because, among other things, "Ms. Mulhern did not attempt to investigate employee resumes or files to determine what percentage of their time was spent on [research and development]" and because "Ms. Mulhern's calculation ignored Mr. Sharma's testimony that both Mr. Gibson and Dr. Wang assisted in business development activities for Solaria; Ms. Mulhern did not apportion the [research and development] work of Mr. Gibson and Dr. Wang from their business development work." *See id.* at 59-60.

I find that Ms. Mulhern's reliance on Mr. Sharma's testimony is warranted under the circumstances of this investigation. Mr. Sharma is a founder of Solaria and served as its President and CEO from 2013 to 2020. Tr. (Sharma) at 46:1-20. Mr. Sharma has personal knowledge of the employees that performed research and development activities relating to the Domestic Industry Products and the nature of the tasks they performed. I find that Mr. Sharma's testimony is credible and reliable and that Ms. Mulhern's reliance on this testimony is appropriate. As for whether business development activities for certain employees should have been discounted,

PUBLIC VERSION

Canadian Solar has provided no evidence that such activities diminished Solaria's allocable expenses in any material way.

b) Capital

The evidence shows that, from 2017 to 2020, Solaria invested [REDACTED] in capital for materials used to develop and test prototypes, third-party technical consulting, and third-party testing related to the design and development of the Domestic Industry Products. Tr. (Mulhern) at 717:1-21; CDX-0004C.18 (Mulhern Demonstratives).

Ms. Mulhern applied a sales-based allocation to Solaria's expenditures and concluded that, from January 2017 through September 15, 2020, Solaria invested [REDACTED] in materials used to develop, produce, and test prototypes and samples of the Domestic Industry Products. Tr. (Mulhern) at 718:14-17; CPX-0635C (Solaria Expenditures); CPX-0713C (Solaria Q3 2020 Income Statement); *see* CDX-0004C.19 (Mulhern Demonstratives); CDX-0019C.0123 (Ex. 11 to Mulhern Rpt.). These materials included adhesives to bind solar cells together purchased from Henkel Corporation and protective packaging purchased from [REDACTED]. Tr. (Sharma) at 80:6-81:6; Tr. (Mulhern) at 718:6-13; CPX-0635C ("Misc. Materials Spending").

Ms. Mulhern also concluded that Solaria spent [REDACTED] from January 2017 through September 15, 2020, on third-party technical consultants who provided R&D services such as evaluating feedstock materials and designing solar cells. Tr. (Mulhern) at 718:22-719:20; Tr. (Sharma) at 79:8-80:5; CPX-0636C (Solaria Expenditures); CPX-0675C (P1-P12 2019 Income Statement); CPX-0676C (P1-P12 2020 Income Statement); *see* CDX-0004C.20 (Mulhern Demonstratives); CDX-0019C.0124 (Ex. 12 to Mulhern Rpt.).

The evidence also shows that Solaria spent [REDACTED] from January 2017 through September 15, 2020, on third-party testing related to the Domestic Industry Products, including

PUBLIC VERSION

reliability and performance testing. Tr. (Mulhern) at 720:16-19; CPX-0713C (Solaria Q3 2020 Income Statement); CPX-0635C (Solaria Expenditures); RX-0103C (Sharma Depo. Tr.) at 322-23; *see* CDX.0004C.21 (Mulhern Demonstratives); CDX-0019C.0125-126 (Ex. 13 to Mulhern Rpt.). At least the following companies tested component materials and performed performance and reliability testing on the Domestic Industry Products for Solaria in the United States:

- 3D-Micromac AG;
- BrightSpot Automation LLC;
- Covalent Metrology Services Inc.;
- DNV GL PVEL, LLC;
- DNV GL PVEL, LLC dba PVEL LLC;
- DNV Kema Renewables, Inc.;
- RETC LLC;
- SAS Institute Inc.;
- SolarPTL, LLC;
- TUV Rheinland of North America, Inc.
- TUV Rheinland PTL, LLC; and
- TUV SUD Certification and Testing.

Tr. (Sharma) at 81:18-82:7; RX-0103C at 322-23; CPX-0713C; CPX-0635C.

C. Significance Analysis

Solaria's domestic investments in the Domestic Industry Products are qualitatively significant when considered in the context of Solaria's business. Solaria is a business based in the

PUBLIC VERSION

United States, and the Solaria personnel responsible for developing all aspects of the Domestic Industry Products and for developing the manufacturing processes for these products are also based in the United States. These facts alone establish significance.¹⁰ *See* Tr. (Mulhern) at 727:10-728:4; CX-0739 (Solaria Website); CDX-0004C.26-28.

Solaria's domestic investments are also quantitatively significant. Ms. Mulhern testified that quantitative significance is established because 100% of Solaria's research and development activities are based in the United States, and 66 of Solaria's 78 total employees are located in the United States. Tr. (Mulhern) at 728:5-729:12; *see* CDX-0004C.28; *see also* RX-0103C (Sharma Tr.) at 15, 16, 28-30, 132, 196, 301; CDX-0019C.0125-126.

Quantitative and qualitative significance is also demonstrated because Solaria's domestic investments in research and development, labor, and facilities for the Domestic Industry Products total approximately [REDACTED] of Solaria's investments in labor and facilities used for manufacturing the Domestic Industry Products outside the United States. *See* Tr. (Mulhern) at 730:1-18; CDX-0004C.29; *see also* RX-0103C (Sharma Tr.) at 15-16, 28-30; CX-0711C (Solaria Forecast).

Canadian Solar argues that the significance of Solaria's domestic investments is "substantially diminishe[d]" because Solaria accepted a grant from the U.S. Department of Energy (Department of Energy or DOE) to develop domestic manufacturing lines for solar modules but

¹⁰ Canadian Solar argues that "the significance of [Solaria's] labor investments" is "diminishe[d]" because the Domestic Industry Products are produced by SolarPark contract manufacturers in South Korea. *See* RRB at 59. But the fact remains that the design and product engineering for the Domestic Industry Products, as well as manufacturing process engineering, are performed by Solaria employees in Fremont, California. Those skilled American jobs are a significant domestic industry.

PUBLIC VERSION

ultimately was not able to come up with an economically viable domestic production line.¹¹ *See* RIB at 27-28. The fact that Solaria does not manufacture its solar modules domestically is relevant for understanding the context of its domestic industry, but that fact does not negate the millions of dollars that Solaria invests domestically in research and development of the technology at issue in this investigation. The activities involved in that substantial investment were detailed in Section X.A above. *See also* Tr. (Mulhern) at 707:16-24 (discussing the activities Ms. Mulhern considered as part of her domestic industry analysis).

Moreover, whether Solaria purportedly broke a commitment to the Department of Energy to manufacture shingled solar modules in the United States is not fatal to Solaria's domestic industry case. Section 337 does not require a complainant to manufacture domestically in order to satisfy the domestic industry requirement. *See Certain Solid State Storage Drives, Stacked Components, and Products Containing Same*, Inv. No. 337-TA-1097, Comm'n Op. at 14 (USITC June 29, 2018) (“[W]e find that the text of the statute, the legislative history, and Commission precedent do not support narrowing subsections (A) and (B) to exclude non-manufacturing activities, such as investments in engineering and research and development. Rather, the guiding principle is whether the asserted expenditures satisfy the plain language of the statute.”).

Therefore, for the reasons set forth above, I find that Solaria has shown, with respect to the PowerXT Domestic Industry Products manufactured with Genesem and AMAT equipment, a significant domestic investment and plant and equipment and a significant domestic employment of labor and capital.

¹¹ Section XII below addresses in detail Canadian Solar's unclean hands argument with respect to Solaria's grant from the Department of Energy.

PUBLIC VERSION

XI. VALIDITY

Canadian Solar asserts that the asserted claims of the '388 and '333 patents are invalid as anticipated by Solaria's prior sales of its PowerXT and Zero White Space modules, invalid as obvious over various combinations of printed prior art references, and invalid for failure to satisfy the written description and enablement requirements of 35 U.S.C. § 112. These invalidity arguments are addressed in turn below.

A. Priority Date

In this investigation, Canadian Solar asserts that Solaria's sales of PowerXT and Zero White Space modules in 2016 invalidate the asserted claims of the '388 and '333 patents under the on-sale bar provision of 35 U.S.C. § 102(a)(1). RIB at 31-33. As set forth in Section I.D above, the Asserted Patents each claim priority to the '547 provisional application filed on June 13, 2016. If the Asserted Patents can properly claim priority to the '547 provisional application, then Solaria's sales of the PowerXT and Zero White Space modules are not invalidating because no disclosure made by a named inventor within one year of a claimed invention's effective filing date can invalidate the patent. 35 U.S.C. § 102(b). Accordingly, I must resolve the priority date for the Asserted Patents. For Canadian Solar to prevail in its on-sale bar argument, it must prove by clear and convincing evidence that the Asserted Claims are not entitled to the '547 provisional application's priority date. *See Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1327-28 (Fed. Cir. 2008).

1. The '388 Patent

As demonstrated below, the asserted claims of the '388 patent, as well as the claims on which Solaria relies to prove the technical prong of the domestic industry requirement, are entitled to claim priority to the '547 provisional application filed on June 13, 2016, because the '547

PUBLIC VERSION

provisional application discloses each element of each claim and there is no break in the copendency of the chain of applications leading to the '388 patent. *See* 35 U.S.C. § 120.

a) Claim 1

Claim 1 is reproduced here for reference:

1. An apparatus comprising:

a solar module having a plurality of strings, each of the plurality of strings being configured in a parallel electrical arrangement with each other;

a plurality of overlapped photovoltaic strips forming each of the plurality of photovoltaic strings separated from a solar cell, an edge of each of the overlapped photovoltaic strips comprising,

a kerf in a back side of the strip having a depth of from 40% to 60% of a thickness of the solar cell and cut by an ablation from multiple passes of a laser beam, and

a crack extending from the kerf to a front side of the photovoltaic strip, the crack initiated by application of stress;

a first end termination configured along a first end of each of the plurality of strings; and

a second end termination configured along a second end of each of the plurality of strings.

'388 patent at claim 1.

Paragraph 12 of the '547 provisional application recites the first two and final two limitations of claim 1 nearly verbatim, and paragraph 11 addresses using multiple passes of a laser beam. JX-0012 ¶¶ [0011], [0012]. The '547 provisional application also discusses scribing to a depth of "50% (+/-10%)" using a laser that "[a]blates," and then discusses cleaving the solar cell which will form a crack extending from the kerf to the front initiated by application of stress. JX-0012.0056, .0064; *see also* Tr. (Banerjee) at 587:18-589:8.

PUBLIC VERSION

b) Claims 2 and 17

Claim 2 depends from claim 1 and recites the additional limitation “wherein the crack defines a fracture plane.” Claim 17 also depends from claim 1 and recites the additional limitation “wherein the crack is formed by the application of mechanical stress.” The ’547 provisional application describes a “cut and separation process” and also discloses a photo of a fractured solar cell. JX-0012 ¶ [0063]; JX-0012.0064.

c) Claim 3

Claim 3 depends from claim 1 and recites the additional limitation “wherein the thickness is from 170 to 220 microns.” The ’547 provisional application discloses the use of standard cells and an example thickness of 206 microns. JX-0012 ¶ [0068]; JX-0012.0064.

d) Claim 4

Claim 4 depends from claim 1 and recites the additional limitation “wherein the depth is between about 65 and 132 microns.” The ’547 provisional application discloses varying the depth of the kerf. JX-0012.0060. The ’547 provisional application also discloses an exemplary scribe depth of 75-80 microns, as well as scribe depths ranging from around 70 microns to 100 microns at the lowest pulse energy. JX-0012.0060, .0064.

e) Claim 5, 8, and 9

Claim 5 depends from claim 1 and recites the additional limitation “wherein each of the plurality of overlapped photovoltaic strips comprises a plurality of fingers on the front side.” Claim 8 also depends from claim 1 and recites the additional limitation “wherein each of the plurality of overlapped photovoltaic strips comprises a bus bar on the front side.” Claim 9 similarly depends from claim 1 and recites the additional limitation “wherein each of the plurality of overlapped photovoltaic strips comprises a bus bar on the back side.”

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The '547 provisional application discloses various metallization patterns for the solar cells, including fingers on the front side, bus bars on the front side, and back side bus bars. JX-0012.0043 (bus bars on front side), .0047 (bus bars on back side), .0069 (fingers on front side), Figs. 2 and 3. *See id.* at Fig. 2, Fig. 3 (depicting front side fingers and bus bars, and back side bus bars).

f) Claim 11

Claim 11 depends from 1 and recites the additional limitation “an Electrically Conducting Adhesive (ECA) between overlapped photovoltaic strips.” The '547 provisional application discloses the use of electrically conductive adhesive to connect overlapping photovoltaic strips. JX-0012 ¶ [0038].

g) Claims 13-16

Claims 13 through 16 depend from claim 1 and require that the plurality of overlapped photovoltaic strips have a width of about 1/5 the width of the solar cell, a width of about 31.2 mm, a width of about 1/6 the width of the solar cell, and a width of about 26 mm, respectively. The '547 provisional application discloses 1/5th and 1/6th cut solar cells, which are about 31.2 mm and 26 mm in width respectively. JX-0012 ¶¶ [0067], [0068].

h) Claim 19

Claim 19 depends from claim 1 and recites the additional limitation “wherein the laser beam comprises an infrared (IR) laser.” The '547 provisional application does not expressly disclose an “infrared” laser. But the '547 provisional application does contain several teachings about using a laser to scribe solar cells. For example, the '547 application details an embodiment that uses a 532 nm wavelength laser in the green spectrum. JX-0012 ¶ [0010]. The application also discloses the use of a general laser to scribe solar cells, including a slide, reproduced below, titled “Laser Scribe Desirable Characteristics.” JX-0012.0056. The slide lists observations about

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the invention, such as “[s]cribe from the backside” and “[u]se a laser that [a]blates rather than melts the silicon.” JX-0012.0056. This disclosure is agnostic as to the wavelength and output power of the laser used:



Laser Scribe Desirable Characteristics

- Scribe from the backside away from the PN junction
 - Reduces edge losses
- Scribe a narrow kerf
 - Remove as little material as possible
 - A narrow cut is more likely to cleave rather than crack the PV cell
- Scribe 50% (+/-10%) of the cell thickness^D
 - Allows for a clean cleave
 - Allows for cell thickness variation
- Use a laser that ablates rather than melts the silicon
 - Keep the heat affected zone to a minimum
 - Reduces damage to the cell = keeps performance high

JX-0012.0056 (excerpt from presentation slide attached to the '547 provisional application).

When asked about this slide at the hearing, Solaria’s expert Dr. Banerjee testified that “[a]ll that it tells you is a [person of ordinary skill in the art] should use a laser with desirable characteristics, desirable as in a laser that would ablate rather than melt the silicon.” Tr. (Banerjee) at 590:21-591:4. Dr. Banerjee further testified that “[i]t could be any type of laser, IR [infrared], UV [ultraviolet], whatever power need[ed] to ablate silicon from the kerf region.” Tr. (Banerjee) at 591:5-8.

Solaria adduced evidence showing that a person of ordinary skill in the art at the time would understand, from the application’s description of ablation by a green laser, that the invention could

PUBLIC VERSION

be used with lasers of other wavelengths besides green. *See* JX-0012 ¶ [0010]. Indeed, Dr. Banerjee analyzed paragraph 10 of the '547 provisional application, which expressly discloses the 532 nm laser, and testified that “all these parameters in '547 in my opinion are exemplary.” Tr. (Banerjee) at 591:9-592:1 (referencing JX-0012 ¶ [0010]).

As articulated by the Federal Circuit, the test for whether an inventor had possession of the claimed subject matter as of the filing date “requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art.” *Ariad Pharms.*, 598 F.3d at 1351. “Based on that inquiry, the specification must describe an invention understandable to that skilled artisan and show that the inventor actually invented the invention claimed.” *Id.* There is no dispute that a person of skill in the art at the time of the '547 provisional application would have known that ablation of silicon could be accomplished with lasers having ultraviolet, green, and infrared wavelengths. I therefore find that a person of skill in the art would understand from reading the '547 provisional application that the invention encompasses, and the inventors had possession of, a variety of different laser wavelengths, including ultraviolet, green, and infrared, for use in the claimed invention.

Accordingly, I find that claim 19 of the '388 patent should be afforded a priority date of at least June 13, 2016, the date the '547 provisional application was filed.

i) Claim 20

Claim 20 depends from claim 1 and recites the additional limitation “wherein the multiple passes of the laser beam comprise a repetition rate of between about 100-300 kHz.” The '547 provisional application discloses the use of laser beams operating at a repetition rate of 100 to 300 kHz. JX-0012.0060.

PUBLIC VERSION

2. The '333 Patent

As demonstrated below, the asserted claims of the '333 patent, as well as the claims on which Solaria relies to prove the technical prong of the domestic industry requirement, are entitled to claim priority to the '547 provisional application filed on June 13, 2016, because the '547 provisional application discloses each element of each claim and there is no break in the copendency of the chain of applications leading to the '333 patent. *See* 35 U.S.C. § 120.

a) Claim 1

Claim 1 is reproduced here for reference:

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 at least twice 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.

'333 patent at claim 1.

Paragraphs 10 and 11 of the '547 provisional application recite the limitations of claim 1 nearly verbatim. JX-0012 ¶¶ [0010], [0011]; *see also* Tr. (Banerjee) at 589:9-590:8. In addition, page 56 of the '547 provisional application discloses scribing to “50% (+/-10%) of the cell thickness.” JX-0012.0056.

PUBLIC VERSION

b) Claims 2 and 3

Claim 2 depends from claim 1 and recites the additional limitation “wherein removing the vaporized material comprises subjecting a fluid, using a laminar flow, within the vicinity of the ablation.” Claim 3 also depends from claim 1 and recites the additional limitation “wherein removing the vaporized material comprises delivering a jet of fluid to the vicinity of the ablation.” The ’547 provisional application discloses “subjecting a jet of fluid” and “using a laminar flow” to remove vaporized material in paragraph 11. JX-0012 ¶ [0011].

c) Claim 6

Claim 6 depends from claim 1 and recites the additional limitation “wherein the laser beam has a wavelength in a green portion of the spectrum.” The ’547 provisional application discloses the use of a 532 nm laser, which is in the green spectrum. JX-0012 ¶ [0010].

d) Claim 8

Claim 8 depends from claim 1 and recites the additional limitation “wherein the laser source comprises an infrared (IR) laser.” As discussed above in Section XI.A.1.h) with respect to claim 19 of the ’388 patent, the record evidence shows that a person of ordinary skill in the art would understand that the invention comprises, and the inventors had possession of, an infrared laser source for scribing solar cells in accordance with the claimed invention. The ’547 provisional application therefore discloses the additional limitation recited in claim 8 of the ’333 patent.

e) Claim 9

Claim 9 depends from claim 1 and recites the additional limitation “wherein the scribe region is shaped as a notch as viewed along an end of the scribe region.” The ’547 provisional application discloses a “notch” shaped scribe region. JX-0012 ¶ [0011].

PUBLIC VERSION

f) Claim 12

Claim 12 depends from claim 1 and recites the additional limitation “wherein the thickness is from 170 to 220 microns.” The ’547 provisional application discloses the use of standard cells and discloses an example thickness of 206 microns. JX-0012 ¶ [0068]; JX-0012.0064.

g) Claim 13

Claim 13 depends from claim 1 and recites the additional limitation “wherein the length is 156 mm+/-2 mm.” The ’547 provisional application discloses a cell that is “156 mm and within about two mm.” JX-0012 ¶ [0060].

h) Claims 14-16

Claims 14, 15, and 16 depend from claim 1 and require that the depth is between about 65 and 132 microns, that the width is from about 15% to 40% of the depth, and that the width is from about 7% to 20% of the thickness, respectively. The ’547 provisional application discloses varying the depth and width of the kerf. JX-0012.0059-.0061. In particular, the ’547 provisional application discloses an example scribe depth of 75-80 microns, as well as depths ranging from around 70 microns to 100 microns at the lowest pulse energy. JX-0012.0060, .0064. The ’547 provisional application also discloses various ratios of kerf width to scribe depth, including ratios from about 20% to 60%. *See* JX-0012.0059. Canadian Solar does not dispute that the ’547 provisional application discloses the additional limitations recited in claims 14-16. *See* RIB at 33-39; RRB at 30-49.

i) Claim 17

Claim 17 depends from claim 1 and recites the additional limitation “wherein subjecting the portion of the backside to the laser beam comprises applying the laser beam at a repetition rate

PUBLIC VERSION

of between about 100-300 kHz.” The ’547 provisional application discloses the use of laser beams operating at a repetition rate of 100 to 300 kHz. JX-0012.0060.

B. On-Sale Bar

As discussed above in Section XI.A, I found that the asserted claims of the ’388 and ’333 patents are entitled to a priority date of at least June 13, 2016, which is the filing date of the ’547 provisional application. Accordingly, Solaria’s sales of the PowerXT and Zero White Space modules in 2016 do not invalidate the claims of the ’388 and ’333 patents because those sales were not more than one year before the priority date of those patents. *See* 35 U.S.C. § 102(b).

C. The Asserted Prior Art References

Canadian Solar asserts that combinations of various prior art references render obvious the asserted claims of the ’388 and ’333 patents. RIB at 47-69. These prior art references are summarized in this section. Sections XI.D and XI.E below compare these prior references to the patent claims.

1. Jinno-205

“Jinno-205” refers to Japanese Patent Application No. 2006-233289, filed by Sanyo Electric Co., Ltd., and published on March 13, 2008. RX-0531.0002. Jinno-205 is thus prior art under 35 U.S.C. § 102(a). Jinno-205 describes the laser scribing of solar cells. RX-0531 at [0007]. Jinno-205 examines various laser scribing depths and teaches that using a laser to scribe solar cells to a scribe depth of 35-65% of cell thickness is preferred, with a depth of 35-50% more preferred. *Id.* Jinno-205 teaches that this range of scribe depth is preferred because it improves solar cell performance and allows for easy cleavage. *Id.* Jinno-205 also teaches using a laser to scribe from the back side of the solar cell. RX-0531 at [0007], [0020], [0022], Fig. 1.

PUBLIC VERSION

2. Hong

“Hong” refers to Korean Patent No. KR10-1058073 that issued in 2011. RX-0533.0002. Hong is thus prior art under 35 U.S.C. § 102(a). Hong teaches using laser scribing equipment to partially cut solar cells and then mechanically breaking the cells. *Id.* Hong teaches that any “publicly known laser irradiation means may be used.” *See* RX-0533 at [0050]. Further, Hong’s laser scribing equipment includes an “air nozzle 223” for removing “toxic gas and particles” generated during the laser scribing of the solar cells and a vacuum system (“air suction hole 224” and “exhaust duct 223”) to capture the debris. *Id.* at [0051]-[0055], Figs. 4-5.

3. Morad

“Morad” refers to U.S. Patent Application Publication No. 2015/0349167 that was filed on October 31, 2014, and published on December 3, 2015. RX-0562. Morad is thus prior art under 35 U.S.C. § 102(a).

4. Breitenstein

“Breitenstein” refers to an article titled “Shunts due to laser scribing of solar cells evaluated by highly sensitive lock-in thermography” written by O. Breitenstein et al. RX-0535. Breitenstein was published in 2001 is thus prior art under 35 U.S.C. § 102(a).

5. Hendel

“Hendel” refers to the article “Laser Applications in Solar Cell Manufacturing” written by Richard Hendel. RX-0459. Hendel was published in 2008 and is thus prior art under 35 U.S.C. § 102(a).

D. The ’333 Patent Claims Are Not Obvious

Canadian Solar asserts that the combination of Jinno-2005 and Hong render the asserted claims of the ’333 patent obvious under 35 U.S.C. § 103. RIB at 47-56. As discussed below,

PUBLIC VERSION

Canadian Solar's obviousness argument fails because the references in combination do not disclose all limitations of claims 1, from which all other asserted claims depend. Canadian Solar has also failed to show that claim 17 is obvious in view of Jinno-205 and Hong because neither teaches "a repetition rate of between about 100-300 kHz" and because a person of ordinary skill in the art would not have been motivated to modify Jinno-205 to arrive at the claimed repetition rate.

1. Claim 1

a) "the backside having a metal material"

Claim 1 of the '333 patent requires that the claimed solar cell have a backside "having a metal material." Jinno-205 does not explicitly disclose a solar cell having metal on the backside. *See* Tr. (Banerjee) at 1223:16-24. Canadian Solar does not dispute that Jinno-205 fails to teach metal on the backside; Canadian Solar instead argues that "all crystalline silicon solar cells have metal on the back." RIB at 49-50 (citing Tr. (Shea) at 986:20-987:5). But Canadian Solar cites only the conclusory testimony of its expert on this point, uncorroborated by contemporaneous documents or other evidence. *Id.* Canadian Solar's showing fails to demonstrate that Jinno-205 inherently discloses metal on the backside.

The use of inherency "must be carefully circumscribed in the context of obviousness." *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1195 (Fed. Cir. 2014). The limitation at issue "necessarily must be present, or the natural result of the combination of elements explicitly disclosed by the prior art." *Id.* at 1196. The mere fact that the solar cells of Jinn-205 *might* have metal on the backside is not enough. *See Hansgird v. Kemmer*, 102 F.2d 212, 214 (C.C.P.A. 1939) ("Inherency, however, may not be established by probabilities or possibilities.").

PUBLIC VERSION

Canadian Solar also argues that Jinno-205 teaches metal on the backside because Jinno-205 discloses an “HIT-type solar cell” and another patent filed by the same inventor (RX-0534 [hereinafter Jinno-604]) describes HIT-type solar cells with metal backside contacts. *See* RIB at 50. This argument also misses the mark because nothing in Jinno-205 indicates that the solar cells it describes are “HIT-type” or that the solar cells in Jinno-205 are the same as those described in Jinno-604. Other evidence indicates the solar cells in Jinno-205 are *not* the same as those in Jinno-604. For example, Jinno-604 discloses solar cells with both front- and back-side electrodes, whereas Jinno-205 discloses only front-side collector electrodes. RX-0534 at Fig. 3; RX-0531 ¶ [0038], Fig. 7. Canadian Solar’s evidence does not show that solar cells with a metal backside “necessarily must be present” in the Jinno-205 disclosure. *See PAR Pharm.*, 773 F.3d at 1195.

Canadian Solar does not contend that Hong expressly or inherently teaches a solar cell having a metal backside. *See* RIB at 49-50.

b) “at least twice”

Claim 1 of the ’333 patent also requires “subjecting a portion of the backside to the laser beam at least twice.” Jinno-205 teaches that “*If necessary*, a dividing groove can be formed by having the laser scan multiple times,” but does not explain when multiple passes would be necessary. RX-0531 ¶ [0013] (emphasis added). Solaria’s expert Dr. Banerjee testified that a person of ordinary skill in the art would not have been motivated by the teachings of Jinno-205 to perform multiple passes with the laser beam but would instead have been motivated to scribe the solar cell using a only single laser pass based on the contemporary art. Tr. (Banerjee) at 1212:14-1214:2, 1214:8-1215:6. For instance, the Jinno-604 contemporary reference teaches that “the division groove 5a is formed continuously, so there are few portions irradiated twice by the

PUBLIC VERSION

laser beam, so the risk of the semiconductor junction being destroyed is reduced.” RX-0534.0007. Thus, according to Jinno-604, scribing using multiple laser passes was understood at the time to increase “the risk of the semiconductor junction being destroyed.” *Id.*

Additional evidence demonstrates that, at the time of the '333 patent, the industry was skeptical of using multiple passes with a laser beam to manufacture a commercial solar module product. Tr. (Banerjee) at 1238:11-25. Dr. Banerjee testified regarding several contemporary publications that cautioned against scribing with multiple passes and instead taught that a single pass would result in faster manufacturing and decrease the parallel conductance. Tr. (Banerjee) at 1238:11-1239:14 (“[I]t will take shorter time, because it talks about in using these scanner systems, how these are extra scans that introduce extra time.”), 1214:13-1215:6 (“So you want to not increase the parallel conductance, and that would be one of the deleterious effects of multiple scans.”); CX-0231.0014 (“[A] multiple-pass approach can significantly impact the laser scribing throughout.”); CX-0230.0009 (“Benefits of using a single scan are fairly significant from a manufacturing process point of view.”); RX-0561.0005 (“[T]he number of laser scribes per run should be kept to a minimum, since these increase the parallel conductance.”). A person of ordinary skill in the art would have viewed multiple laser passes as unsuitable for manufacturing commercial solar cells because this technique was both slower than using a single pass and also more likely to damage the solar cell. *See* Tr. (Banerjee) at 1214:13-1215:6, 1238:11-1239:14.

Canadian Solar does not contend that Hong expressly or inherently teaches exposing the silicon to a solar cell “at least twice” in the manner required by claim 1. *See* RIB at 49, 50-52.

PUBLIC VERSION

c) **Claim 1 Conclusion**

I have considered Jinno-205, Hong, the understanding of a person of skill in the art at the time of the invention, and secondary considerations.¹² Viewing the record as a whole, I find a person of ordinary skill in the art reading Jinno-205 and Hong would not have arrived at the claimed invention. The combination does not necessarily disclose a solar cell with a metal backside, and a person of skill would not have been motivated to expose the silicon to a laser beam “at least twice” at the time of the invention. Accordingly, I determine that Canadian Solar has not presented clear and convincing evidence that claim 1 of the ’333 patent is invalid as obvious.

2. Claim 17: “a repetition rate of between about 100-300 kHz”

Claim 17 depends from claim 1 and recites the additional limitation “wherein subjecting the portion of the backside to the laser beam comprises applying the laser beam at a repetition rate of between about 100-300 kHz.” Jinno-205 teaches using a laser operating at a repetition rate of 25 kHz. RX-0531 ¶ [0029], and Hong is silent as to the repetition rate of the laser it describes.

Canadian Solar argues that contemporary laser manufactures Spectra-Physics and Coherent recommended using repetition rates of 100-300 kHz to scribe solar cells and that a person of ordinary skill in the art would therefore be motivated to modify the teachings of Jinno-205 to use a repetition rate of 100-300 kHz. *See* RIB at 54. The evidence does not show, however, why a person of ordinary skill in the art would be so motivated. Canadian Solar at most has demonstrated that contemporary lasers could operate with repetition rates in the range recited in claim 17. By contrast, Dr. Banerjee testified that changing the repetition rate of the laser in Jinno-205 to 100-300 kHz would have a significant impact on laser scribing, thereby leading to a

¹² Secondary considerations of non-obviousness are addressed in Section XI.F below.

PUBLIC VERSION

conclusion that a person of ordinary skill in the art would not have made that change. Tr. (Banerjee) 1215:3-17.

Therefore, Canadian Solar has failed to show that a person of ordinary skill in the art would have been motivated to modify the laser in Jinno-205 to arrive at “a repetition rate of between about 100-300 kHz” or that such a person of skill would have had a reasonable expectation of success by doing so. For these reasons, in addition to the reasons stated in connection with claim 1, Canadian Solar has not shown that claim 17 of the '333 patent is invalid as obvious.

E. The '388 Patent Claims Are Not Obvious

Canadian Solar asserts that the asserted claims of the '388 patent are rendered obvious under 35 U.S.C. § 103 by Morad in view of Jinno-205. RIB at 57-69. As discussed below, Canadian Solar's arguments fail because Morad and Jinno-205, alone or in combination, fail to disclose key elements of the asserted '388 claims and because a person of ordinary skill in the art would not have been motivated to combine Morad with Jinno-205 to achieve the claimed inventions.

1. Morad Fails to Disclose Key Limitations

As set forth in detail below, Morad alone cannot render the '388 asserted claims obvious because Morad fails to disclose limitations recited in independent claim 1 and dependent claim 20.

a) Claim 1: “a kerf in a back side of the strip” and “a crack extending from the kerf to a front side of the photovoltaic strip”

Independent claim 1 of the '388 patent requires a kerf to be formed by a laser beam on the back side of each photovoltaic strip and a crack extending from the kerf to the front side of the strip. As disclosed in the '388 patent, the front side of the strip is the sun-facing side. '388 patent at 5:58-61. By contrast, Morad describes a process that creates strips with a kerf on the front of

PUBLIC VERSION

the solar cell and a crack extending from the kerf to the back side of the strip. *See* Tr. (Banerjee) at 1204:22-1205:13. Canadian Solar admitted that Morad fails to disclose scribing on the back side in its response to Solaria’s interrogatory. CX-0402C.0597 (“... Morad 2015 does not disclose . . . that the laser beam scribes the backside of the solar cell . . .”).

Morad teaches separating solar cells using the apparatus depicted in Figure 20A (reproduced below). This figure indisputably shows laser scribing on the front side of the solar cell and not scribing on the back side as recited in claim 1 of the ’388 patent. *See* RIB at 59; CRB at 49. In Morad, the solar cells are placed on a perforated moving belt with their front side facing upward. RX-0562 ¶¶ [0083], [0244]. Figure 20A shows laser scribe lines (identified with tag 45) on the front side of the solar cell:

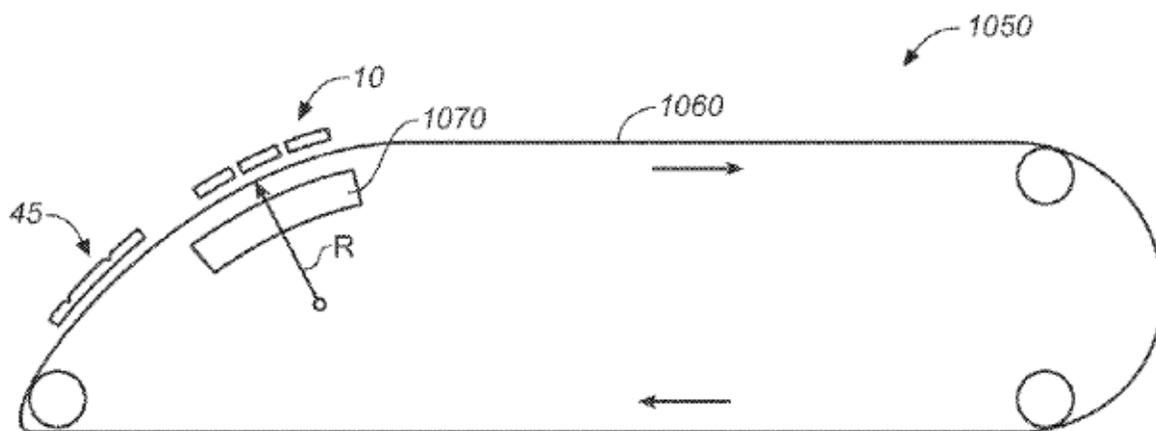


FIG. 20A

RX-0562: Morad at Figure 20A

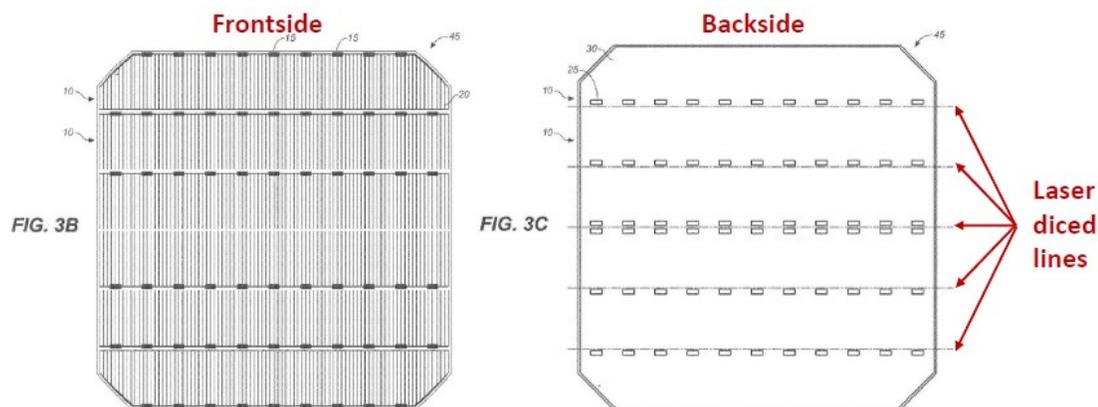
Morad also teaches applying an uncured adhesive bonding material to the front side of the solar cell before laser scribing the cell on this side. RX-0562 ¶ [0243]. Other embodiments disclosed in Morad involve performing laser scribing on the front surface to define “rectangular regions” before applying electrically conductive adhesive bonding material adjacent to those

PUBLIC VERSION

rectangular regions. RX-0562 ¶ [0015]. Nothing in Morad teaches laser scribing on the back side of the solar cell.

Canadian Solar’s expert Dr. Shea contends otherwise, however, and testified that Figure 3C and paragraph 246 of Morad disclose laser scribing on the back side. *See* Tr. (Shea) at 1012:2-17, 1014:2-6. Dr. Shea’s testimony is not supported by the weight of the record evidence.

With respect to Figure 3C, Dr. Shea admitted on cross-examination that he created a demonstrative superimposing the words “Laser diced lines” on this figure because Morad does not actually teach laser scribing on the back side. Tr. (Shea) at 1103:1-8. Dr. Shea further admitted that he was merely making an “inference that the dashed lines [in Figure 3C] depict laser scribing from the back side.” Tr. (Shea) at 1103:17-22.



RDX-003C.0030: Shea demonstrative slide with added notations in red

Dr. Shea’s testimony was contradicted by that of Dr. Banerjee, who testified that Morad teaches the solar cell shown in Figure 3C “may be *diced* along the dashed lines,” and not laser scribed. Tr. (Banerjee) at 1202:10-1203:14; RX-0562 ¶ 103. As used in Morad, the term “diced” means “separated.” RX-0562 ¶ [0101]. Dr. Banerjee further testified that Figure 3C “show[s] the lines where the singulation process is appearing, . . . not the surface that the laser scribing is being

PUBLIC VERSION

done.” Tr. (Banerjee) at 1203:9-14. Indeed, Morad consistently teaches laser scribing on the front side of the solar cell followed by cleaving. *See* RX-0562 ¶ [0243].

With respect to Dr. Shea’s testimony about paragraph 246 of Morad, the passage in question reads in part:

Any other suitable apparatus may also be used to cleave scribed solar cells to which conductive adhesive bonding material has been applied to form strip solar cells with pre-applied conductive adhesive bonding material. Such apparatus may, for example, use rollers to apply pressure to the top surface of the solar cell to which the conductive adhesive bonding material has been applied.

RX-0562 ¶ [0246]. Dr. Shea’s testimony reads too much into this paragraph and infers back-side scribing when it is not actually disclosed. As Dr. Banerjee testified, this paragraph describes “a kerf on the front surface” formed so that an application of pressure to the front side will create “tensile stress to singulate the cells” as they travel across a ledge. Tr. (Banerjee) at 1206:6-1207:6.

Thus, Canadian Solar has not demonstrated that Morad teaches a laser-scribed “kerf in a back side of the strip” or “a crack extending from the kerf to a front side of the photovoltaic strip.”

b) Claim 1: “a depth of from 40% to 60% of a thickness of the solar cell and cut by an ablation from multiple passes”

It is undisputed that Morad does not disclose any of the laser scribing parameters claimed in the ’388 patent, including the depth of the kerf and number of passes scribed the laser. *See* Tr. (Banerjee) at 1196:18-1197:7; Tr. (Shea) at 1101:15-1102:13.

c) Claim 20: “a repetition rate of between about 100-300 kHz”

It is undisputed that Morad does not disclose the repetition rate of a laser. *See* RIB at 63.

2. Morad in Combination with Jinno-205

Canadian Solar argues that a person of ordinary skill in the art would be motivated to combine Morad with the Jinno-205 to arrive at the inventions claimed in the ’388 patent, but these arguments ultimately fail. *See* RIB at 57-69. Morad discloses shingled solar modules connected

PUBLIC VERSION

in overlapping parallel strips using electrically conductive bonding material, whereas Jinno-205 connects individual solar cells using metallic wire-bonding and is therefore, as Dr. Banerjee testified, in a “totally different application space.” Tr. (Banerjee) at 1207:14-24, 1208:2-19; RX-0531 ¶¶ [0002], [0017]. As discussed below, the combination of Morad with Jinno-205 does not render obvious the asserted claims of the ’388 patent.

a) Claim 1

“a kerf in a back side of the strip” and “a crack extending from the kerf to a front side of the photovoltaic strip”

Due to the fundamental differences between shingled cell and wire-bonding technology, the laser scribing, singulation, and stringing processes disclosed in Morad and Jinno-205 are not compatible. As Dr. Banerjee testified, Morad discloses laser scribing from the front side, applying electrically conductive adhesive, and bending the cells, while Jinno-205 discloses laser scribing on a “primary surface,” stressing the cell with a rod to crack the cell into multiple pieces, and connecting the pieces with lead wires. RX-0531 ¶¶ [0008, 0024]; Tr. (Banerjee) at 1208:20-1211:8. The evidence shows that the scribing and singulation process disclosed in Morad is motivated by the use of an electrically conductive adhesive—an element not present in Jinno-205—and that a person of ordinary skill in the art would therefore not look to Jinno-205 to modify the scribing and singulation process found in Morad. Tr. (Banerjee) at 1210:21-1211:16.

Dr. Banerjee testified that the electrically conductive adhesive in Morad is applied to the front side of the solar cell such that the front side must face away from the singulation apparatus. *See* Tr. (Banerjee) at 1200:14-1201:19; RX-0562 ¶ [0244] (“Advantageously, solar cell 45 may be cleaved by this method *without contacting the top surface of solar cell 45 to which the conductive adhesive bonding material has been applied.*”) (emphasis added). If the kerf were on the back

PUBLIC VERSION

side of the solar cell in Morad, there would be “compressive stress along the kerf” that “would not be conducive to proper cleavage.” *See* Tr. (Banerjee) at 1200:14-1201:19. Moreover, as Dr. Banerjee testified, Morad teaches that scribing from the front side prevents the laser from “heating up and curing the [electrically conductive] material,” which “would then have deleterious effects on the bonding of the strips.” *See* Tr. (Banerjee) at 1200:14-1202:9; RX-0562 ¶ [0243].

In view of these teachings, Canadian Solar has failed to show that a person of ordinary skill in the art would have been motivated to combine Jinno-205 with Morad to form a laser scribed kerf on the back side of the solar cell or that such a person would have had a reasonable expectation of success by doing so.

“multiple passes of a laser beam”

Canadian Solar has not demonstrated that a person of ordinary skill in the art would be motivated to modify the teachings of Morad to form a kerf “cut by an ablation from multiple passes of a laser beam” based on the teachings of Jinno-205. Jinno-205 teaches that, “[i]f necessary, a dividing groove can be formed by having the laser scan multiple times.” RX-0531 ¶ [0013] (emphasis added). But, as discussed above in Section XI.D.1.b), a skilled artisan would not have been motivated by Jinno-205 to expose the silicon to multiple laser passes because of the prevailing concerns about collateral damage to the solar cell. If anything, Morad reinforces those the concerns when it describes what Dr. Banerjee characterizes as “deleterious effects” of laser heating, which would be exacerbated by multiple passes of the laser. *See* Tr. (Banerjee) at 1200:14-1202:9; RX-0562 ¶ [0243].

PUBLIC VERSION

Claim 1 Conclusion

I have considered Morad, Jinno-205, the understanding of a person of skill in the art at the time of the invention, and secondary considerations.¹³ Viewing the record as a whole, I find a person of ordinary skill in the art reading Morad and Jinno-205 would not have arrived at the claimed invention. As noted above, the Morad and Jinno-205 technologies are fundamentally incompatible, which cuts against motivation to combine them. Further, a person of skill would not have been motivated to expose the silicon to a laser beam “at least twice” at the time of the invention. Accordingly, I determine that Canadian Solar has not presented clear and convincing evidence that claim 1 of the '388 patent is invalid as obvious.

b) Claim 20: “a repetition rate of between about 100-300 kHz”

As explained above in Section XI.D.2, Jinno-205 teaches using a laser with a repetition rate much lower than 100-300 kHz. RX-0531 ¶ [0029]. Canadian Solar does not contend that Morad teaches a repetition rate. *See* RIB at 63. As with the invention claimed in the '333 patent, Canadian Solar has not demonstrated that a person of ordinary skill in the art would modify the repetition rate in Jinno-205 to achieve the invention claimed in the '388 patent.

3. Morad in Combination with Breitenstein and Hendel

Canadian Solar argues that claim 19 of the '388 patent is rendered obvious by the combination of Morad with Breitenstein and Hendel. RIB at 64. Claim 19 depends from claim 1, so to prevail Canadian Solar must show the three-piece combination would lead to an invention with at least the elements of claim 1. Canadian Solar's argument fails to meet even that threshold, however, because it has not demonstrated that a person of ordinary skill in the art would be

¹³ Secondary considerations of non-obviousness are addressed in Section XI.F below.

PUBLIC VERSION

motivated to combine these references. In addition, the combination of these references would not achieve a kerf formed by multiple passes of the laser or a kerf formed on the back side of the solar cell, both of which are elements of claim 1, and by dependency, claim 19.

a) No Motivation to Combine

Canadian Solar has failed to demonstrate by clear and convincing evidence that a person of ordinary skill in the art would have been motivated to combine the teachings of Morad, Breitenstein, and Hendel to achieve the claimed inventions of the '388 patent. *See* RIB at 64. At most, Canadian Solar has shown that each claim element was independently known, and that does not prove the invention as a whole was obvious. *See KSR*, 550 U.S. at 401 (“A patent composed of several elements is not proved obvious by merely demonstrating that each of its elements was, independently, known in the prior art.”). Canadian Solar’s combination of elements in these three disparate references appears to have been guided by impermissible hindsight, not a motivation that would have occurred to the hypothetical artisan at the time of the invention. *Cf. Star Scientific*, 655 F.3d at 1375 (an obviousness analysis must be free from “any hint of hindsight”).

Dr. Banerjee testified that these three references teach different applications and would not be combined by a person of ordinary skill. Tr. (Banerjee) at 1217:6-1218:13. While Morad teaches a shingled solar module, Breitenstein is in the field of forming “minor solar applications like battery chargers” and Hendel does not deal with shingled modules. Tr. (Banerjee) at 1218:7-13, 1219:23-12:20-6. Dr. Banerjee also testified that Breitenstein is an academic paper that would not be applicable to an industrial manufacturing process for a solar module. Tr. (Banerjee) at 1218:4-6, 1219:3-6. An examination of key limitations confirms that the hypothetical artisan would not arrive at the claimed invention from these three references.

PUBLIC VERSION

b) “a kerf in a back side of the strip” and “a crack extending from the kerf to a front side of the photovoltaic strip”

As explained above in Section XI.E.1.a), Morad does not teach forming a kerf on the back side of the solar cell. Canadian Solar argues that Breitenstein discloses back-side laser scribing, but Canadian Solar fails to explain why a person of ordinary skill in the art would be motivated to modify Morad to form a kerf on the back side. *See* RIB at 66. As Dr. Banerjee testified, there is no motivation to modify Morad to scribe from the back of the cell as taught by Breitenstein. Tr. (Banerjee) at 1221:20-1222:3. If Morad were scribed on the back side, the laser would heat Morad’s electrically conductive adhesive material, which, as Dr. Banerjee explained, “would then have deleterious effects on the bonding of the strips.” *See* Tr. (Banerjee) at 1200:14-1202:9; RX-0562 ¶ [0243]. And even if this were not enough to discourage the hypothetical artisan from attempting the combination, these same facts show a person of ordinary skill in the art would not be successful in modifying Morad to arrive at the claimed invention. Tr. (Banerjee) at 1221:20-1222:3.

Similar to Morad, Hendel also teaches laser scribing from the front (sun-facing) side of a solar cell. Tr. (Banerjee) at 220:7-19. Canadian Solar argues that this deficit in Hendel’s teaching is overcome because Hendel’s front-side teachings relate to “edge isolation” scribing and not for singulation scribing. *See* RIB at 66-67. But Canadian Solar did not raise this argument in its pre-hearing brief. I therefore deem this argument improperly presented and decline to address it here. *See* Order No. 8 at Ground Rule 11.2 (deeming a contention abandoned or withdrawn if it is not set forth in detail in a party’s pre-hearing brief).

In sum, the record does not show that a person of skill in the art would have been motivated to combine Morad, Breitenstein, and Hendel to achieve “a kerf in a back side of the strip” and “a

PUBLIC VERSION

crack extending from the kerf to a front side of the photovoltaic strip,” or that such a person would have had a reasonable expectation of success by doing so.

c) “multiple passes of a laser beam”

As Dr. Banerjee testified, a person of ordinary skill in the art would not be motivated to combine Morad with Breitenstein and Hendel to scribe a kerf with “multiple passes of a laser beam” because a process using multiple passes would have been seen in the industry as too slow. *See* Tr. (Banerjee) at 1219:7-18. Although Hendel does disclose using multiple passes, this reference characterizes this as a “new approach[.]” that can only achieve a scribing speed of 200 mm/s. RX-0459.0003 (Hendel). By contrast, Hendel teaches that a single-pass scribe can achieve a scribing speed of “up to 5,000 mm/s,” fifty times faster than a multiple-pass scribing speed. *See* RX-0459.0001. And Breitenstein does not teach multiple passes of a laser beam at all; Breitenstein teaches that the depth of a kerf can be varied by modifying the power and scan speed of the laser beam. *See* Tr. (Banerjee) at 1222:13-22; RX-0535 at 59.

Given the disparate teachings about laser beam passes and scribing speed in these three references, I find that Canadian Solar’s combination is based on the hindsight provided by the ’388 patent, not because a hypothetical artisan would have been motivated to combine the references at the time of the invention. Additionally, I find the record does not show an artisan combining the teachings of Morad, Breitenstein, and Hendel would have a reasonable expectation of success in scribing by multiple passes of a laser beam.

PUBLIC VERSION

d) Claim 19 Conclusion

I have considered Morad, Breitenstein, Hendel, the understanding of a person of skill in the art at the time of the invention, and secondary considerations.¹⁴ Viewing the record as a whole, I find a person of ordinary skill in the art reading Morad, Breitenstein, and Hendel would not have arrived at the invention in claim 19. Such a person would not be motivated to combine these references given their disparate teachings. In addition, the combination of these references would not achieve a kerf formed by multiple passes of the laser or a kerf formed on the back side of the solar cell. Accordingly, I determine that Canadian Solar has not presented clear and convincing evidence that claim 19 of the '388 patent is invalid as obvious.

F. Secondary Considerations

Solaria offers evidence of secondary considerations of non-obviousness to show that the prior art combinations asserted by Canadian Solar do not render obvious the asserted claims of the '388 and '333 patent. CRB at 59-64. I have weighed the secondary consideration evidence in my obviousness analysis and I discuss it below. *Apple Inc. v. Samsung Elec. Co., Ltd.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016) (*en banc*).

1. Nexus

As discussed above in Section IX, the record evidence establishes that Solaria's PowerXT shingled solar modules embody the inventions claimed in the '388 and '333 patents. I must presume, therefore, that there is a nexus between the secondary considerations and the non-obviousness of the Asserted Patents. *WBIP, LLC*, 829 F.3d at 1330.

¹⁴ Secondary considerations of non-obviousness are addressed in Section XI.F below.

PUBLIC VERSION

2. Commercial Success

Solaria adduced evidence showing that the Domestic Industry Products have experienced high growth in sales revenue from 2016 through 2020, thereby demonstrating the commercial success of the patented technology. *See* Tr. (Mulhern) at 1261:10-1262:5. Solaria witnesses testified that the benefits of shingling solar modules, which include increased module efficiency, increased electrical output, and an aesthetically appealing all-black design, result from the patented technology. *See* Tr. (Sharma) at 47:3-48:19; Tr. (Gibson) at 220:4-221:9. The patented technology also resulted in reduced manufacturing costs, which in turn increased Solaria's net revenue. *See* Tr. (Gibson) at 222:24-224:12. This factor weighs against a conclusion that the inventions in the two patents are obvious.

3. Industry Skepticism and Teaching Away

As discussed above in Section XI.D.1.b), Solaria's expert Dr. Banerjee testified that the industry was skeptical of using multiple passes with a laser beam to manufacture a commercial solar module product. Tr. (Banerjee) at 1238:11-25. Dr. Banerjee examined contemporaneous academic publications that cautioned against using multiple laser passes because a single pass would result in faster manufacturing time and decrease the parallel conductance within the solar cell. Tr. (Banerjee) at 1238:11-1239:14, 1214:13-1215:6; CX-0231.0014 (“[A] multiple-pass approach can significantly impact the laser scribing throughout.”); CX-0230.0009 (“Benefits of using a single scan are fairly significant from a manufacturing process point of view.”); RX-0561.0005 (“[T]he number of laser scribes per run should be kept to a minimum, since these increase the parallel conductance.”). The evidence shows that a person of skill in the art at the time of the invention would not perform multiple laser passes when scribing solar cells but would

PUBLIC VERSION

instead be led to using only a single laser pass. Tr. (Banerjee) at 1238:11-1239:14; *see also* Tr. (Banerjee) at 1214:13-1215:6.

Canadian Solar's internal development documents corroborate the industry skepticism of the approach used in the invention. For example, a November 2015 email from Canadian Solar's former CTO to its CEO discussed "key obstacles" including "Laser scribing/cleaving yield loss" and "Shunting and other reliability issues." Tr. (Banerjee) at 1239:15-1240:11; CX-0086C. Canadian Solar's designated corporate witness also testified that Canadian Solar had concerns with the reliability of the new shingled solar module technology, the ability to produce it, and how to control costs. *See* CX-0890C (Tang Depo. Tr.) at 126-131. These concerns were echoed as recently as 2019 in internal emails to Canadian Solar's CEO Dr. Shawn Qu. *See* CX-0569C ("HiDM product will discuss later soon, there are some concerns on the reliability performance.").

This factor weighs against a conclusion that the inventions in the two patents are obvious.

4. Copying

Solaria adduced evidence to suggest that Canadian Solar copied Solaria's manufacturing process for shingled solar cell modules. In particular, Solaria founder Mr. Sharma testified about technical meetings between engineers from Solaria and Canadian Solar. Tr. (Sharma) at 118:4-21, 119:7-120:15. At those meetings, Solaria presented technical information describing its technology under a non-disclosure agreement. Tr. (Sharma) at 118:4-21, 119:7-120:15; CX-0890C (Tang Depo. Tr.) at 139-150, 160-163. Canadian Solar did not develop the shingled solar cell modules accused of infringement until after these meetings with Solaria. *See* Tr. (Koerner) at 813:9-815:15.

This factor weighs against a conclusion that the inventions in the two patents are obvious.

PUBLIC VERSION

5. Secondary Considerations Conclusion

Here, Solaria’s commercial success with the PowerXT products that practice the ’388 and ’333 patents supports a finding that the inventions claimed therein are not obvious. Moreover, Canadian Solar’s skepticism about shingled solar cell technology, combined with its entry into the shingled solar cell marketplace after its engineers met with Solaria’s engineers to discuss Solaria’s technology, also support a finding that the inventions claimed in the Asserted Patents are not obvious. *See Chemours Co. FC, LLC v. Dalkin Indus., Ltd.*, 4 F.4th 1370, 1378 (Fed. Cir. 2021) (“When a patentee can demonstrate commercial success, usually shown by significant sales in a relevant market, and that the successful product is the invention disclosed and claimed in the patent, it is presumed that the commercial success is due to the patented invention.”) (quotation marks and citation omitted).

Viewing the record evidence as a whole, including all asserted prior art combinations, the knowledge of a person of ordinary skill in the art, and secondary considerations, I find Canadian Solar has not shown by clear and convincing evidence that any relevant claim of the ’388 and ’333 patents is invalid as obvious.

G. Written Description and Enablement

Canadian Solar asserts that the asserted claims of the ’388 and ’333 patents are invalid for failure to satisfy the written description and enablement requirements of 35 U.S.C. § 112. RIB at 69-70. Specifically, with respect to written description, Canadian Solar argues:

To the extent the Asserted Claims are understood to cover all laser removal, including via infrared lasers that melt silicon and create slag, those claims lack written description support. . . . The specification does not describe how to avoid slag with an infrared laser. . . . Rather, the specification is expressly critical of the use of infrared and its effects, and calls for a laser that is able to remove material at “lower power levels [that] cause an ablation mechanism in which small particles, which can be described as dust particles, are effectively

PUBLIC VERSION

chipped away from the cell material by the laser.” . . . Hence, the specification neither supports the claims’ “full scope” nor shows a [person of ordinary skill in the art] that the inventors possessed the full scope of the claimed invention.

RIB at 69.

With respect to enablement, Canadian Solar argues that “[n]one of the conditions or parameters for infrared laser use were disclosed in the specification of the Asserted Patents” and that “while ultrafast infrared lasers may be able to ablate silicon under the right conditions, the parameters for achieving that result were not disclosed in the specification and it would take considerable experimentation to find them.” RIB at 70. Canadian Solar further argues that the asserted claims are invalid for lack of enablement because, “[e]ven assuming there are conditions where an infrared laser beam could cause ablation, the specification does not show how to discern them without undue experimentation.” *Id.*

Canadian Solar’s written description argument is a thinly disguised reworking of its claim construction argument as to the term “ablation,” where it took the position that the claimed “ablation” is limited to photoablation, or the direct breaking of chemical bonds wherein there is no melting of the silicon and no slag is created. *See* RIB at 3-7. As discussed above in Section VII, the term “ablation” in the ’388 and ’333 patents refers generally to the removal of material using a laser. This removal can be through a wide spectrum of mechanisms including photoablation, melting followed by removal by cavitation or shockwaves, and boiling followed by vaporization. *See, e.g.*, CDX-0003C.0051 (Dr. Banerjee demonstrative slide illustrating various ablation mechanisms). Moreover, as discussed above in Section XI.A, the ’547 provisional application filed on June 13, 2016, provides written description support for all claims asserted in this investigation, including claim 19 of the ’388 patent and claim 8 of the ’333 patent, both of which recite an infrared laser.

PUBLIC VERSION

Canadian Solar's enablement argument fares no better. A person of ordinary skill in the art reading the Asserted Patents would not have needed undue experimentation to find appropriate parameters to ablate silicon with an infrared laser in accordance with the claimed inventions. The record shows that experimentation to optimize laser conditions, if necessary, would be straightforward based on the teachings of the patent. *See* Tr. (Banerjee) at 507:9-508:16; Tr. (Gibson) at 282:15-287:23.

Therefore, for these reasons, I find that Canadian Solar has failed to show by clear and convincing evidence that the relevant claims of the '388 and '333 patents are invalid for failure to satisfy the written description and enablement requirements of 35 U.S.C. § 112.

XII. OTHER DEFENSES TO INFRINGEMENT

Canadian Solar asserts that Solaria's unclean hands renders the '333 patent unenforceable in this investigation. *See* RIB at 21-29. Canadian Solar's allegations relate to work Solaria performed in 2015 pursuant to a grant from the Department of Energy to develop equipment to manufacture shingled solar modules in the United States. *See id.* at 23-25. Solaria argues that Canadian Solar's unclean hands defense must fail because it is wrong on both the facts on the law. CRB at 18-27.¹⁵

The undisputed evidence establishes that Solaria performed work in 2015 pursuant to a Department of Energy grant in 2015. *See, e.g.*, RX-0398, RX-0399; RX-0170. One of the

¹⁵ Solaria also argues that Canadian Solar failed to adequately plead its unclean hands defense. CRB at 18 n.5. I previously granted Canadian Solar leave to amend its response to the complaint to include allegations of unclean hands; Canadian Solar has not filed an amended response to date. *See* Order No. 11 at 2-3 (Aug. 5, 2021). Commission Rule 210.14(c) allows amendment of a pleading to conform to the evidence presented. 19 C.F.R. § 210.14(c). I hereby deem Canadian Solar's response to the complaint amended to include an equitable defense of unclean hands in accordance with the Commission Rules.

PUBLIC VERSION

provisions of the grant award required Solaria to disclose any inventions or patents arising from the grant project to the Department of Energy. RX-0394.0009; *see* Tr. (Gibson) at 454:5-21. Canadian Solar argues that this provision required Solaria to report the '333 patent to the Department of Energy, and that Solaria's failure to do so results in unclean hands such that Solaria should be barred from enforcing the '333 patent in this investigation. *See* RIB at 21-29. In particular, Canadian Solar alleges that Solaria developed the inventions claimed in the '333 patent while working with the Genesem laser in the 2015, pursuant to the Department of Energy grant. *See id.* at 23-25. Solaria disputes that the activities it performed in development of the '333 patent, including its experimentation with the Genesem laser, are coextensive with the Department of Energy grant such that it had an obligation to disclose the '333 patent. *See* CRB at 19-24. The evidence relevant to the parties' dispute is addressed below.

Solaria founder Suvi Sharma and '333 inventor Kevin Gibson—who was also the principal investigator for the Department of Energy grant project—testified that the scope of the grant differed from the scope of the '333 patent. Mr. Sharma testified that the grant was “to cover the development of the equipment to make the shingled solar modules in the U.S.” Tr. (Sharma) at 181:23-182:3. When asked whether the grant related to developing the manufacturing equipment or to developing the process for making shingled solar modules, Mr. Sharma testified that “[i]t was specifically for the equipment.” Tr. (Sharma) at 182:4-9. Mr. Gibson explained that the overall goal of the Department of Energy grant “was to be able to develop equipment, lower cost equipment or equipment that had higher throughput.” Tr. (Gibson) at 308:3-8.

Solaria also adduced evidence to show that its work with the Genesem laser in 2015 was unconnected to the requirements of the Department of Energy grant project, and that Solaria satisfied its grant obligations using equipment from supplier DMS. For example, Mr. Sharma

PUBLIC VERSION

testified that “Genesem was not the equipment partner for [the DOE] project.” *See* RX-0103C (Sharma Depo. Tr.) at 252:18-253:2; 254:4-10. Mr. Gibson also testified that Solaria went with “DMS, Display Manufacturing Systems,” to build the equipment used for the Department of Energy grant. Tr. (Gibson) at 310:16-19. Solaria installed the DMS equipment in its facility in Fremont, California, and used it to generate the data it submitted to the Department of Energy in the Final Technical Report. Tr. (Gibson) at 310:2-311:11; RX-0170.0026-.0030 (Final Technical Report); CX-0699C.0003-0006 (DMS Scriber/Singulator Results).

Mr. Gibson testified that the DMS equipment used for the Department of Energy grant differed from the Genesem equipment in ways critical to the scope of the grant. For example, in the DMS equipment “the scribe part of the scriber, laser scriber, and singulator were integrated into one unit” to allowed for improved throughput and yield, goals specified in Task 5 of the Department of Energy grant. *See* Tr. (Gibson) at 312:15-313:3; RX-0170.0011. The evidence shows that Solaria satisfied Task 5 using DMS equipment. RX-0170.0028-.0030; CX-0699C.0003-0006.

In view of the evidence it adduced at the hearing, Solaria argues that “the scope of the DOE grant differs from the subject matter of the ’333 Patent” and “there was no reason to disclose any inventions or discoveries” to the Department of Energy, including the ’547 provisional application or U.S. Patent Application No. 15/622,000 leading to the ’333 patent, “as they were not within the scope of the DOE grant.” *See* CRB at 24.

To dispose of the unclean hands defense, I need not decide whether Solaria breached an obligation to disclose the ’333 patent to the Department of Energy because Canadian Solar has failed to establish a critical element of the defense: an “immediate and necessary relation to the equity” of relief sought by Canadian Solar. *Keystone*, 290 U.S. at 245.

PUBLIC VERSION

Hypothetically, if Solaria had disclosed the '333 patent to the Department of Energy, the parties to this investigation would be in exactly the same positions they are today: Solaria would not have been precluded from enforcing its patent against non-governmental entities such as Canadian Solar, whether before the Commission or in the federal district courts.

At most, any harm resulting from Solaria's alleged failure to disclose the '333 patent to the Department of Energy would inure to the detriment of the United States government. If Solaria had disclosed the '333 patent, it is possible that the United States would have a nonexclusive license to the claimed inventions today. *See* 35 U.S.C. § 202(c)(4). In that scenario, Solaria's action—or inaction, as the case may be—did not harm Canadian Solar in the slightest.¹⁶

Accordingly, I find no connection between Solaria's alleged improper conduct and the legal issues raised in this investigation, *i.e.*, whether Canadian Solar infringes the '333 patent, whether the '333 patent is invalid, and whether the other substantive requirements for relief under section 337 have been satisfied. There is no “immediate and necessary relation to the equity” between Solaria's actions and the relief it seeks before the Commission such that Solaria should be precluded from obtaining such relief if a violation of section 337 is found.

I therefore find Canadian Solar has not demonstrated that Solaria's relief as to the '333 patent should be barred under the equitable defense of unclean hands.

¹⁶ Solaria's actions also likely would have no effect on its remedies against the United States in this forum. If the United States did not receive a license to the '333 patent but desired to import patented articles, it could still do so. *See* 19 U.S.C. § 1337(l) (section 337 exclusion orders “shall not apply to any articles imported by and for the use of the United States”). Solaria's failure to disclose a patent might relieve the government of an obligation to pay royalties set by the U.S. Court of Federal Claims, but Solaria's available remedies at the Commission would not change. *See id.*

PUBLIC VERSION

XIII. CONCLUSIONS OF LAW

1. The Commission has subject matter, personal, and *in rem* jurisdiction in this investigation.
2. The importation requirement has been satisfied.
3. Solaria has standing to assert the '388 and '333 patents.
4. Claims 1-5, 8, 9, 11, 15-17, 19, and 20 of the '388 patent have been infringed by the importation, sale, and use of all Accused Products.
5. Claims 1, 8, 9, 12, and 14-17 of the '333 patent have been infringed by the importation, sale, and use of all Accused Products.
6. Claim 13 of the '333 patent has been infringed by the importation, sale, and use of the HiDM CS1H and HiDM CS1H Black accused products.
7. The technical prong of the domestic industry requirement has been satisfied with respect to the '388 and '333 patents.
8. The economic prong of the domestic industry requirement has been satisfied with respect to the '388 and '333 patents.
9. Claims 1-5, 8, 9, 11, 13-17, 19, and 20 of the '388 patent have not been shown invalid in view of the prior art.
10. Claims 1-3, 6, 8, 9, and 12-17 of the '333 patent have not been shown invalid in view of the prior art.
11. No claim of the '388 patent or the '333 patent has been shown invalid as failing to satisfy the requirements of 35 U.S.C. § 112.
12. Canadian Solar has not demonstrated that unclean hands bars Solaria's requested relief as to the '333 patent.

PUBLIC VERSION

13. A violation of 19 U.S.C. § 1337 has been shown by the importation and sale of articles that infringe claims 1-5, 8, 9, 11, 15-17, 19, and 20 of the '388 patent.

14. A violation of 19 U.S.C. § 1337 has been shown by the importation and sale of articles that infringe claims 1, 8, 9, and 12-17 of the '333 patent.

XIV. RECOMMENDED DETERMINATION ON REMEDY AND BOND

The Commission's Rules provide that the administrative law judge shall issue a recommended determination concerning the appropriate remedy in the event the Commission finds a violation of section 337 and the amount of bond to be posted by respondents during Presidential review of any Commission remedies. *See* 19 C.F.R. § 210.42(a)(1)(ii).

A. Limited Exclusion Order

The Commission has broad discretion in selecting the form, scope, and extent of the remedy in a section 337 proceeding. *Viscofan, S.A. v. U.S. Int'l Trade Comm'n*, 787 F.2d 544, 548 (Fed. Cir. 1986). A limited exclusion order directed to a respondent's infringing products is among the remedies that the Commission may impose. *See* 19 U.S.C. § 1337(d).

With respect to a limited exclusion order, Solaria argues that "the appropriate remedy is [a limited exclusion order] that covers Respondents' infringing products. To the extent Respondents suggest that other, more limited language be used, they have not demonstrated that changing the language of the [limited exclusion order] is necessary or appropriate. They have also not shown that an exception for repair or replacement parts is warranted." CIB at 71 (citing *Certain Pers. Transporters, Components Thereof, and Packaging and Manuals Therefor*, Inv. Nos. 337-TA-1007 and 337-TA-1021 (consolidated), Comm'n Op. at 23 (USITC Jan. 12, 2018)).

Although Canadian Solar does not dispute that a limited exclusion order would be an appropriate remedy for a violation of section 337, it takes the position that any exclusion order

PUBLIC VERSION

“should be limited to the Accused Products in finished form.” RRB at 63. Canadian Solar argues that its solar modules “are in finished form when and if they are commercially imported,” and that Solaria has not shown a need for excluding “components and parts” of the Accused Products. *Id.* at 63-64. Canadian Solar also argues that its customer warranties, which range from 15 to 25 years, mean that “an exception for repair and replacement should apply so that existing solar panel installations are not hampered by the unavailability of a single replacement module.” *Id.* at 64 (citing CX-0143.0001; CX-0067.0001).

If the Commission determines that a violation of section 337 has occurred, I recommend that the Commission issue a limited exclusion order barring entry of products that infringe the Asserted Patents. I do not recommend a warranty and repair exception to the limited exclusion order. Such exceptions may be made if a respondent establishes that its customers expect or require exact replacement parts or will be detrimentally affected by using non-infringing alternatives. *Certain Optoelectronic Devices for Fiber Optic Commc’ns, Components Thereof, & Prods. Containing the Same*, Inv. No. 337-TA-860, Comm’n Op. at 31-33 (Apr. 17, 2014). Here, Canadian Solar has not provided any such evidence from its customers. *See Certain Magnetic Data Storage and Tapes and Cartridges Containing the Same (II)*, Inv. No. 337-TA-1076, Initial Determination at 174, *aff’d*, Comm’n Op. at 61-62 (denying exception because respondent failed to provide sufficient evidence).

I also do not recommend that the limited exclusion order be limited to “Accused Products in finished form” as urged by Canadian Solar. Although Canadian Solar has only imported finished Accused Products into the United States to date, that does not mean that Canadian Solar should receive a free pass to import components destined for future direct infringement. *See*

PUBLIC VERSION

Suprema, Inc. v. Int'l Trade Comm'n, 796 F.3d 1338, 1352–53 (Fed. Cir. 2015) (section 337 “covers goods that were used by an importer to directly infringe post-importation”).

B. Cease and Desist Order

Section 337 provides that in addition to, or in lieu of, the issuance of an exclusion order, the Commission may issue a cease and desist order as a remedy for a violation of section 337. 19 U.S.C. § 1337(f)(1). The Commission may issue a cease and desist order when it has personal jurisdiction over the party against whom the order is directed. *Gamut Trading Co. v. U.S. Int'l Trade Comm'n*, 200 F.3d 775, 784 (Fed. Cir. 1999).

Under Commission precedent, “[c]ease and desist orders are generally issued when, with respect to the imported infringing products, respondents maintain commercially significant inventories in the United States or have significant domestic operations that could undercut the remedy provided by an exclusion order.” *Certain Air Mattress Systems, Components Thereof, and Methods of Using the Same*, Inv. No. 337-TA-971, Comm’n Op. at 49 (May 17, 2017) (citations and footnote omitted). Additionally, at least one Commissioner is of the opinion that the “presence of some infringing domestic inventory, regardless of the commercial significance, provides a basis to issue a cease and desist order.” *Certain L-Tryptophan, L-Tryptophan Products, and Their Methods of Production*, Inv. No. 337-TA-1005, Comm’n Op. at 52 n.49 (Jan. 11, 2018).

Solaria requests that the Commission issue a cease and desist order directed to Canadian Solar in the event a violation of section 337 is found. *See* CIB at 72-73.

The record evidence shows that Canadian Solar maintains an inventory of shingled solar modules in the United States. CX-0874C (Koerner Depo. Tr.) at 43:12-16, 44:13-24, 68:5-23. Thomas Koerner, President of Canadian Solar (USA), Inc. and Corporate Vice President of Canadian Solar’s Modules and Systems Solutions Business Unit, testified that this inventory is

PUBLIC VERSION

stored in leased spaces and is monitored by a logistics team at Canadian Solar (USA), Inc. CX-0874C (Koerner Depo. Tr.) at 11:18-12:8, 64:10-19, 64:25-67:7, 65:10-66:1, 69:6-70:16. Mr. Koerner also testified that Canadian Solar sets a target inventory level of [REDACTED] MW for the Accused Products in the United States. CX-0874C (Koerner Depo. Tr.) at 54:14-20, 183:1-184:3; CX-0859C (Respondents' RFA Responses) at No. 150. While Canadian Solar had inventory totaling only [REDACTED] of HiDM products at the end of 2020; Mr. Koerner explained that this amount was lower than the amount normally on hand. CX-0874C (Koerner Depo. Tr.) at 182:2-183:5, CPX-0568C (CS1H-MS Shipments); CX-0857C (Respondents' RFA Responses) at No. 111.

Solaria's economic expert Ms. Mulhern analyzed the economic significance of the domestic inventories held by Canadian Solar. To do so, she compared actual and expected domestic inventories to Canadian Solar's historical sales data, and she also considered Canadian Solar's inventory levels in terms of the number of residential solar panel installations those volumes could supply. Tr. (Mulhern) at 732:1-735:9. Ms. Mulhern testified that the [REDACTED] domestic inventory Canadian Solar held at the end of 2020 had an estimated value of approximately [REDACTED], could support [REDACTED] days of sales, and could supply between [REDACTED] households. *Id.*; *see also* CX-0874C (Koerner Depo. Tr.) at 182-184, 234-235; CPX-0565C (Canadian Solar Financials); CPX-0568C (CS1H-MS Shipments). CX-0725 (EnergySage website); CX-0754 (Sunrun Website). Ms. Mulhern also testified that Canadian Solar's targeted inventory of [REDACTED] had an estimated value of between [REDACTED], could support [REDACTED] days of sales, and could supply between [REDACTED] households. Tr. (Mulhern) at 733:11-734:11; CPX-0565C; CX-0725; CX-0754.

PUBLIC VERSION

Canadian Solar argues that the [REDACTED] inventory it held domestically at the end of 2020 is not commercially significant and would not allow for the circumvention of an exclusion order. *See* RRB at 65 (citing Tr. (Vander Veen) at 1156:10-23)). Canadian Solar adduced evidence to show that the Accused Products are no longer competitive in terms of efficiency and power output, and that Canadian Solar is introducing a successor product to the Accused Products by the end of 2021. Tr. (Koerner) at 799:21-800:8. Accordingly, Canadian Solar represents that “any inventory during the presidential review period, which is expected to be at a time that Canadian Solar is winding down sales of the Accused Product, is likely to be less than [REDACTED] (less than [REDACTED] days’ worth of sales)” and that a cease and desist order is not warranted in this investigation. *See* RRB at 65.

On the facts of this record, it is my recommendation that no cease and desist order issue if the Commission determines that a violation of section 337 has occurred. The record evidence shows that Canadian Solar held domestic inventories representing approximately [REDACTED] days’ of sales of the Accused Products at the end of 2020. Although Mr. Koerner testified that Canadian Solar sets a higher “target inventory” of the Accused Products, the record does not show that Canadian Solar actually held that level of inventory during this investigation. I find that the demonstrated level of domestic inventory is not commercially significant and that a cease and desist order is not warranted in this investigation.

C. Bond During Presidential Review

Pursuant to section 337(j)(3), the administrative law judge and the Commission must determine the amount of bond to be required of a respondent, during the 60-day Presidential review period following the issuance of permanent relief, in the event that the Commission determines to

PUBLIC VERSION

issue a remedy. The purpose of the bond is to protect the complainant from any injury. 19 U.S.C. § 1337(j)(3); 19 C.F.R. §§ 210.42(a)(1)(ii), 210.50(a)(3).

When reliable price information is available, the Commission has often set the bond by eliminating the differential in sales prices between the domestic product and the imported, infringing product. *Certain Microsphere Adhesives, Process for Making Same, and Products Containing Same, Including Self-Stick Repositionable Notes*, Inv. No. 337-TA-366, Comm'n Op. at 24, USITC Pub. No. 2949 (1995). In other cases, the Commission has turned to alternative approaches, especially when the level of a reasonable royalty rate could be ascertained. *See Certain Integrated Circuit Telecommunication Chips and Products Containing Same, Including Dialing Apparatus*, Inv. No. 337-TA-337, Comm'n Op. at 41-43, USITC Pub. No. 2670 (1995). A 100% bond has been required when no effective alternative existed. *Certain Flash Memory Circuits and Products Containing Same*, Inv. No. 337-TA-382, USITC Pub. No. 3046, Comm'n Op. at 26-27 (July 1997) (a 100% bond imposed when price comparison was not practical because the parties sold products at different levels of commerce, and the proposed royalty rate appeared to be *de minimis* and without adequate support in the record).

The undisputed evidence shows there is direct competition between Solaria and Canadian Solar with respect to the Domestic Industry Products and the Accused Products. *See* Tr. (Sharma) at 89:11-20; Tr. (Mulhern) at 736:3-738:6; CX-0874C (Koerner Depo. Tr.) at 34:21-35:2, 35:21-36:11; 145-46, 154-55. Specifically, Solaria and Canadian Solar sell their shingled solar products through many of the same distributors and installers, including Solaria's two largest distributors, CED Greentech and Soligent, who together account for █████ of Solaria's sales. Tr. (Sharma) at 87:17-88:23, 90:1-5; CX-0874C (Koerner Depo. Tr.) at 201:15-17, 202:18-203:13, 204:14-24; CX-0863 (Soligent Website). Solaria founder and director Suvi Sharma testified that

PUBLIC VERSION

the presence of Canadian Solar's products on the market has led to price erosion for Solaria's products and that Solaria has lost customers, such as [REDACTED], because they can purchase Canadian Solar's products at a lower price compared to Solaria's products. Tr. (Sharma) at 90:1-20.

The record evidence shows that the Domestic Industry Products and Accused Products are priced at wide ranges. For example, Solaria's Domestic Industry Products ranged in price from [REDACTED] per watt in 2020, and Canadian Solar's CS1H Accused Products ranged in price from about [REDACTED] per watt. See Tr. (Mulhern) at 740:4-741:24, 772:19-773:1, 775:12-776:7; CPX-0703C (Solaria Income Statement FY2020); CPX-0702C (2019 PowerXT Sales); Tr. (Koerner) at 799:8-17; CPX-0871C (Respondents' Financials). This pricing variation is driven by a variety of customer- and transaction-specific factors such as customer [REDACTED] [REDACTED] [REDACTED] CX-0874C (Koerner Depo. Tr.) at 72:19-75:4, 75:8-11, 75:14-24, 76:5-12, 76:17-20, 76:24-77:9, 77:11-24, 78:1-79:11. Solaria assesses its pricing frequently and constantly monitors real-time data from its sales and marketing team to determine how competitors are pricing their products and whether any responsive changes need to be made to Solaria's pricing. See Tr. (Sharma) at 88:24-89:25.

In view of the evidence of direct competition between Solaria and Canadian Solar, the price variation in the market for the shingled solar modules at issue in this investigation, and Canadian Solar's undercutting of prices in the market, Solaria argues that a bond of 100% is appropriate in this investigation. See CIB at 74-78.

Canadian Solar argues that Solaria's request for a 100% bond is unsupported by the evidence, especially in view of licenses between Solaria and other entities that correspond to a

PUBLIC VERSION

royalty rate of ██████████%. See RRB at 66-67. Canadian Solar’s position is not persuasive, however, because the licenses between Solaria and these other entities do not cover manufacturing rights for monocrystalline shingled solar modules *in the United States*, which is the primary issue in this investigation. See Tr. (Mulhern) at 743:12-744:17; CX-0605C (Solaria-SunEdison agreement), CX-0607C (Solaria-SunEdison statement of work), CX-0609C (██████████), CX-0610C (██████████), CX-0613C (██████████), CX-0617C (██████████), CX-0619C (██████████), CX-0620C (██████████), CX-0646C (██████████), CX-0657C (██████████), CX-0658C (TLA agreement), CX-0659C (██████████), CX-0691C (██████████), CX-0708C (██████████), CX-0709C (██████████), CX-0710C (██████████), CX-0756C (██████████), CX-0759C (██████████), RX-0103C (Sharma Depo. Tr.) at 95-96, 101, 132, 138, 156-157, 200, 214-215, 297-298, 300-302, 307-309; and CX-0763C (Genesem Decl.). Mr. Sharma testified that Solaria only licenses the sale of monocrystalline shingled solar module products, such as the Domestic Industry Products and Accused Products, to regions outside the United States because the United States is Solaria’s “primary and core market.” Tr. (Sharma) at 94:24-95:24. Thus, the Solaria licenses of record are of limited probative value when analyzing a bond amount in this investigation. See Tr. (Mulhern) at 743:12-744:17.

In the end, the wide variety of pricing by both parties makes the setting of a precise bond rate difficult. Therefore, to prevent any harm to Solaria, as the statute requires, it is my recommendation that the Commission set a 100% bond for any importations of infringing products during the Presidential review period.

PUBLIC VERSION

XV. INITIAL DETERMINATION ON VIOLATION

For the reasons set forth above, it is my initial determination that a violation of section 337 of the Tariff Act, as amended, has occurred in the importation into the United States and the sale within the United States after importation of certain shingled solar modules, components thereof, and methods for manufacturing the same based on infringement of U.S. Patent No. 10,763,388 and U.S. Patent No. 10,651,333.

I hereby certify to the Commission this Initial Determination and the Recommended Determination.

The Secretary shall serve the confidential version of this Initial Determination upon counsel who are signatories to the Protective Order (Order No. 1) issued in this investigation. A public version will be served at a later date upon all parties of record.

Pursuant to 19 C.F.R. § 210.42(h), this Initial Determination shall become the determination of the Commission unless a party files a petition for review pursuant to 19 C.F.R. § 210.43(a) or the Commission, pursuant to 19 C.F.R. § 210.44, orders on its own motion a review of the Initial Determination or certain issues therein.

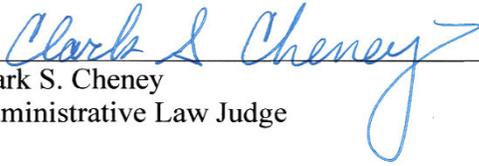
XVI. ORDER

Within seven days of the date of this document, the parties shall jointly submit a single proposed public version with any proposed redactions indicated in red. If the parties submit excessive redactions, they may be required to provide declarations from individuals with personal knowledge, justifying each proposed redaction and specifically explaining why the information sought to be redacted meets the definition for confidential business information set forth in 19 C.F.R. § 201.6(a). The proposed redactions should be made electronically, in a single PDF file using the “Redact Tool” within Adobe Acrobat. The proposed redactions should be submitted as

PUBLIC VERSION

“marked” but not yet “applied.” The proposed redactions should be submitted via email to Cheney337@usitc.gov and not filed on EDIS.

SO ORDERED.



Clark S. Cheney
Administrative Law Judge