

KING & SPALDING

King & Spalding LLP
1700 Pennsylvania Avenue, N.W.
Suite 200
Washington, D.C. 20006
Tel: +1 202 737-0500
Fax: +1 202 626 3737
www.kslaw.com

Jeffrey M. Telep
Partner
Direct Dial: +1 202 626-2390
jtelep@kslaw.com

June 11, 2021

The Honorable Lisa R. Barton
Secretary to the Commission
U.S. International Trade Commission
500 E Street S.W.
Washington, DC 20436

Via EDIS

Re: In the matter of *Certain Silicon Photovoltaic Cells and Modules with Nanostructures, and Products Containing the Same*

Dear Secretary Barton:

Attached for filing on behalf of Complainant Advanced Silicon Group Technologies, LLC (“ASG Technologies,” or “ASGT”) are the following documents in support of ASGT’s request that the Commission commence an investigation pursuant to Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. §1337. We have included a separate letter requesting confidential treatment of certain exhibits included with this filing.

Complainant makes this filing under USITC’s Temporary Change to filing Procedures dated May 16, 2020.

Complainant submits the following:

1. One (1) electronic submission of the Complainant’s public Verified Complaint and a statement of Public Interest pursuant to 19 C.F.R. §§ 210.4(f)(2), 210.8(a)(1)(i), and 210.8(b);
2. One (1) electronic copy of public Exhibits to the public Verified Complaint pursuant to 19 C.F.R. §§ 210.4(f)(2), 210.4(f)(7)(i), and 210.8(a)(1)(i);

3. One (1) electronic copy of Confidential Exhibits to the public Verified Complaint pursuant to 19 C.F.R. §§ 201.6(c), 210.4(f)(2), and 210.8(a)(1)(ii);
4. One (1) electronic certified copy of each of United States Patent Nos. 8,450,599 (the “’599 patent”); 8,852,981 (the “’981 patent”); 9,601,640 (the “’640 patent”); 9,768,331 (the “’331 patent”); 10,269,995 (the “’995 patent”); and 10,692,971 (the “’971 patent”) listed as Exhibits 1, 3, 5, 7, 9 and 11 in the Complaint (Commission Rules 210.8(a)(1)(i) and 210.12(a)(9)(i));
5. One (1) electronic certified copy of each assignment for the ’599 patent, ’981 patent, ’640 patent, ’331 patent, ’995 patent, and ’971 patent listed as Exhibits 2, 4, 6, 8, 10, and 12 in the Complaint (Commission Rules 210.8(a)(1)(i) and 210.12(a)(9)(ii))¹;
6. One (1) electronic certified copy of each of the prosecution histories for the ’599 patent, ’981 patent, ’640 patent, ’331 patent, ’995 patent, and ’971 patent listed as Appendices A, C, E, G, I, and K in the Complaint (Commission Rule 210.12(c)(1));
7. One (1) electronic copy of applicable pages of each technical reference mentioned in the prosecution history of each of the ’599 patent, ’981 patent, ’640 patent, ’331 patent, ’995 patent, and ’971 patent listed as Appendices B, D, F, H, J, and L in the Complaint (Commission Rule 210.12(c)(2)); and
8. A letter of certification pursuant to Commission Rules 201.6(b) and 210.5(d) requesting confidential treatment of information appearing in Confidential Exhibits 21, 26, 30, 32, 41, 44, 51, 53, and 54 to the Verified Complaint.

Thank you for your attention to this filing. Please contact the undersigned if you have any questions.

Respectfully submitted,

KING & SPALDING



Jeffrey M. Telep

Counsel for Complainant Advanced Silicon Group Technologies, LLC

Attachments

¹ Complainant has enclosed an uncertified version of one assignment, attached as Exhibits 8E and 10E of the Complaint, because the certified version is not yet available from the U.S. Patent and Trademark Office. As soon as it becomes available, Complainant will amend its complaint to add the certified version of the assignment.

KING & SPALDING

King & Spalding LLP
1700 Pennsylvania Avenue, N.W.
Suite 200
Washington, D.C. 20006
Tel: +1 202 737-0500
Fax: +1 202 626 3737
www.kslaw.com

Jeffrey M. Telep
Partner
Direct Dial: +1 202 626-2390
jtelep@kslaw.com

June 11, 2021

The Honorable Lisa R. Barton
Secretary to the Commission
U.S. International Trade Commission
500 E Street S.W.
Washington, DC 20436

Re: In the matter of *Certain Silicon Photovoltaic Cells and Modules with Nanostructures, and Products Containing the Same*; Request for Confidential Treatment

Dear Secretary Barton:

In accordance with 19 C.F.R. §§ 201.6 and 210.5, Complainant Advanced Silicon Group Technologies, LLC (“ASG Technologies,” or “ASGT”) requests confidential treatment for the confidential business information contained in Confidential Exhibits 21, 26, 30, 32, 41, 44, 51, 53, and 54 to ASGT’s Verified Complaint.

The information for which confidential treatment is sought is proprietary commercial information and consists of the following:

- Business proprietary information regarding technical specifications, testing results, and/or installation specifications for the product on which ASGT’s claim of domestic industry is based (Confidential Exhibits 26, 53 and 54);
- Business proprietary information regarding ASGT’s purchases of infringing articles (Confidential Exhibits 30, 32, 41, 44, and 51);
- Business proprietary information regarding the license agreement between ASGT and its domestic licensee, ASG Inc. (Confidential Exhibit 21); and

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Page 2 of 2

- Business proprietary information regarding the investments on which ASGT's claim of domestic industry is based (Confidential Exhibits 53 and 54);

The information described above qualifies as confidential business information pursuant to Rule 201.6(a) because:

1. It is not publicly available;
2. Unauthorized disclosure of such information could cause substantial harm to the competitive position of Complainant; and
3. The disclosure of such information could impair the Commission's ability to obtain information necessary to perform its statutory function.

Please contact the undersigned if you have any questions about this request, or if this request is not granted in full.

Respectfully submitted,

KING & SPALDING

A handwritten signature in black ink that reads "Jeffrey M. Telep". The signature is written in a cursive style and is positioned above the printed name and title.

Jeffrey M. Telep

*Counsel for Complainant Advanced Silicon Group
Technologies, LLC*

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

In The Matter Of

CERTAIN SILICON PHOTOVOLTAIC
CELLS AND MODULES WITH
NANOSTRUCTURES, AND PRODUCTS
CONTAINING THE SAME

Investigation No. 337-TA ____

COMPLAINANT'S PUBLIC INTEREST STATEMENT

/s/ Michael F. Heafey

Michael F. Heafey
THE LAW OFFICES OF MICHAEL F.
HEAFEY
1325 Howard Street, No. 160
Burlingame, California 94010
(650) 346-4161

/s/ Robert Kent

Robert Kent
Zhuanjia Gu
TURNER BOYD LLP
702 Marshall Street
Suite 640
Redwood City, California 94063
(650) 521-5930

/s/ Jeffrey M. Telep

Jeffrey M. Telep
Richard C. Lutz, Consultant
KING & SPALDING LLP
1700 Pennsylvania Avenue, NW
Suite 200
Washington, DC 20006
(202) 737-0500

Joseph D. Eng, Jr.
KING & SPALDING LLP
1185 Avenue of the Americas
New York, NY 10036
(212) 556-2100

Counsel to Complainant

June 11, 2021

Pursuant to 19 C.F.R. § 210.8(b), Complainant, Advanced Silicon Group Technologies, LLC (“ASG Technologies” or “Complainant”), respectfully submits this public interest statement regarding the potential public interest effects that would be caused by the requested exclusion orders. According to the accompanying complaint, Complainant seeks limited exclusion orders on all silicon photovoltaic cells and modules with nanostructures, and products containing same, that infringe U.S. Patent No. 8,450,599 (the “’599 Patent”), U.S. Patent No. 8,852,981 (the “’981 Patent”), U.S. Patent No. 9,601,640 (the “’640 Patent”), U.S. Patent No. 9,768,331 (the “’331 Patent”), U.S. Patent No. 10,269,995 (the “’995 Patent”), and U.S. Patent No. 10,692,971 (the “’971 Patent”) (collectively, the “Asserted Patents”) that are imported, sold for importation, and/or sold after importation by or on behalf of any of the proposed respondents (the “Accused Products”). Complainant also seeks cease-and-desist orders halting any importing, selling, offering for sale, advertising, marketing, demonstrating, qualifying for use in the products of others, transferring, distributing, warehousing inventory for distribution, using, assembling, or testing of the Accused Products by the proposed respondents.

As described below, the requested relief would not adversely affect public health, safety, or welfare conditions in the United States, competitive conditions in the U.S. economy, production of like or directly competitive articles in the United States, or U.S. consumers. Accordingly, the Commission should not delegate the public interest to the Administrative Law Judge (“ALJ”), or require the parties to conduct discovery.

I. The Public Interest Favors the Protection of Complainant’s Intellectual Property Rights

The Commission has made clear that the protection of intellectual property rights is strongly in the public interest. *See, e.g., Certain Digital Television Prods. & Certain Prods. Containing Same & Methods of Using Same*, Inv. No. 337-TA-617, Comm’n Op. at 9 (Aug. 2,

2009). That protection is to be denied only in limited situations. Any public interest concerns implicated by this investigation, to the extent there are any, are outweighed by the countervailing interest in protecting Complainant's intellectual property rights.

II. How the Articles Potentially Subject to the Orders Are Used in the United States

The Accused Products are silicon photovoltaic cells and modules in which at least one surface of the photovoltaic cell has nanostructures, nanowires, or both. Silicon photovoltaic cells are used to produce photovoltaic modules, and photovoltaic modules are used to absorb sunlight as a source of energy to generate electricity. In the United States, photovoltaic modules are used to power the electrical systems of commercial or residential buildings, or utility grids.

III. No Public Health, Safety, or Welfare Concerns in the United States Relate to the Requested Remedial Orders

The Accused Products used in the United States do not implicate any unique public health, safety, or welfare-related concerns. The Commission's public health, safety, or welfare considerations traditionally have been limited to pharmaceutical drugs or medical devices. *See, e.g., Certain Fluidized Supporting Apparatus*, Inv. No. 337-TA-182/188, Comm'n Op. (denying relief to Complainants on public interest grounds in an investigation of infringing hospital beds for burn patients). *See also Certain Toothbrushes and the Packaging Thereof*, Inv. No. 337-TA-391, Commission Op. on Remedy, the Public Interest, and Bonding, 1997 WL 696291, at *2 (Oct. 15, 1997) (explaining that the articles at issue "are not the type of product that have in the past raised public interest concerns (such as, for example, drugs or medical devices)"). The Accused Products in this investigation are not drugs, medical devices, vaccines, or products used to treat or cure a disease or injury. Although the Accused Products are used to generate electricity in an efficient, non-polluting manner, the exclusion of them will not adversely affect

the public interest, as non-accused articles can easily replace the volume of Respondents' Accused Products. See ¶ IV, *infra*.

IV. Like or Directly Competitive Articles of Third Parties Can Replace the Accused Products

Silicon photovoltaic cells and modules manufactured by third parties can replace the proposed respondents' Accused Products if the Commission issues the requested relief. The proposed respondents' 2020 U.S. sales of Accused Products are estimated to account for only approximately 8 gigawatts of energy generation.¹ Third-party manufacturers of non-accused products, such as Tongwei, LONGi, JinkoSolar, Aiko, JA Solar, Trina Solar, First Solar, and UREC, all produce various types of solar cells and solar modules. These non-accused third parties are ranked among the world's top ten solar module manufacturers by production and volume.² The combined estimated production of these alternative sources of supply is approximately 64.3 gigawatts – eight times the estimated U.S. sales of the proposed respondents.³ In short, a sufficient number of other manufacturers of solar cells and solar modules can maintain competitive conditions in the U.S. economy and fill any void created by issuance of the requested remedial orders.

¹ This estimate was derived from the proposed respondents' financial disclosures, U.S. Customs data, and industry data. In particular, accused product shipment volumes for Canadian Solar, Hanwha Q, and Boviet were estimated based upon published industry and company data, as well as U.S. Customs' ship manifest data as published by Datamyne. The proposed respondents' total 2020 estimated sales value was then divided by the 2020 average sales price per watt as published by the Solar Energy Industries Association ("SEIA") in order to derive the amount of watts (or gigawatts) sold by the proposed respondents in 2020.

² See <https://www.statista.com/statistics/269741/the-biggest-solar-module-manufacturers-worldwide-based-on-production/>

³ *Id.*

V. Third Parties Have the Capacity to Replace the Volume of Articles Subject to the Requested Exclusion Order in a Commercially Reasonable Time

As described above, the proposed respondents' Accused Products accounted for only a portion of the U.S. solar cell and module market in 2020. Multiple firms in the solar industry whose products are not accused in this investigation supplied the majority of the market. These firms have capacity to meet U.S. demand in a commercially reasonable time if the Accused Products are excluded under the requested remedial orders.

Industry sources estimate approximately 20 gigawatts of U.S. solar installation in 2020.⁴ The proposed respondents accounted for approximately 8 gigawatts of that installed capacity. The International Energy Association estimates global photovoltaic cell manufacturing capacity (which would include non-accused manufacturers) at more than 160 gigawatts, with annual demand/annual installations of approximately 90 gigawatts.⁵ By this measure, the global excess capacity is approximately 70 gigawatts, which is 3.5 times (*i.e.* 70 GW/20 GW) greater than total U.S. annual installations. Similarly, applying the global excess capacity factor of 1.78 (*i.e.*, 160 GW/90 GW) to the 64.3 gigawatts of production attributable to non-accused suppliers yields 114.5 gigawatts of available production capacity from the top ten solar module producers. This estimated available capacity from the largest non-accused producers is 5.7 times greater than current annual U.S. installations and 14.3 times greater than the proposed respondents' 2020 U.S. sales. The proposed respondents' limited U.S. shipment volume of Accused Products, combined

⁴ SEIA, "Solar Market Insight Report 2020 Q4" <https://www.seia.org/research-resources/solar-market-insight-report-2020-q4> (Dec. 15, 2020).

⁵ IEA Renewable Energy Market Update – Outlook for 2020 and 2021 (March 2020) *available at* <https://www.webstore.iea.org>. The Commission also acknowledged massive excess capacity in the solar industry during 2018, reporting 160 gigawatts of global capacity compared to 116 gigawatts of global production. *See Crystalline Silicon Photovoltaic Cells Whether or Not Partially or Fully Assembled Into Other Products: Monitoring Developments in the Domestic Industry*, Inv. No. TA-201-075 (Monitoring) (February 2020) at I-21.

with the massive global excess capacity, demonstrate that suppliers of non-accused products could easily replace the volume of proposed respondents' Accused Products, should such products be excluded under the requested remedial orders.

VI. The Requested Exclusion Orders Will Not Adversely Impact U.S. Consumers

The requested exclusion orders will not adversely impact consumers, because adequate supply of non-accused silicon photovoltaic cells and modules will continue to exist in the U.S. market. As discussed above, no unfilled void will result from the requested remedial orders because more than ten manufacturers produce silicon photovoltaic cells and modules that are available in the U.S. market that could easily replace the volume of the excluded articles. Thus, U.S. consumers will not be deprived of products enabling the use of solar energy to power electrical systems in residential or commercial applications.

Respectfully submitted,

/s/ Michael F. Heafey

Michael F. Heafey
THE LAW OFFICES OF MICHAEL F.
HEAFEY
1325 Howard Street
No. 160
Burlingame, California 94010
(650) 346-4161

/s/ Jeffrey M. Telep

Jeffrey M. Telep
Richard C. Lutz, Consultant
KING & SPALDING LLP
1700 Pennsylvania Avenue, NW
Suite 200
Washington, DC 20006
(202) 737-0500

/s/ Robert Kent

Robert Kent
Zhuanjia Gu
TURNER BOYD LLP
702 Marshall Street
Suite 640
Redwood City, California 94063
(650) 521-5930

Joseph D. Eng, Jr.
KING & SPALDING LLP
1185 Avenue of the Americas
New York, NY 10036
(212) 556-2100

Counsel to Complainant

June 11, 2021

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

In The Matter Of

**CERTAIN SILICON PHOTOVOLTAIC
CELLS AND MODULES WITH
NANOSTRUCTURES, AND PRODUCTS
CONTAINING THE SAME**

Investigation No. 337-TA____

**VERIFIED COMPLAINT OF ADVANCED SILICON GROUP TECHNOLOGIES, LLC
UNDER SECTION 337 OF THE
TARIFF ACT OF 1930, AS AMENDED**

COMPLAINANT:

Advanced Silicon Group Technologies, LLC
600 Suffolk Street
Lowell, Massachusetts 01854
Telephone: (954) 471-1357

COUNSEL FOR COMPLAINANT:

Jeffrey M. Telep
Richard C. Lutz, Consultant
KING & SPALDING LLP
1700 Pennsylvania Avenue, NW, Suite 200
Washington, DC 20006
Telephone: (202) 737-0500

Joseph D. Eng Jr.
KING & SPALDING LLP
1185 Avenue of the Americas
New York, NY, 10036
Telephone: (212) 556-2100

Michael F. Heafey
THE LAW OFFICES OF MICHAEL F.
HEAFEY
1325 Howard Street, No. 160
Burlingame, California 94010
Telephone: (650) 346-4161

PROPOSED RESPONDENTS:

Canadian Solar, Inc.
545 Speedvale Avenue West
Guelph, Ontario, Canada N1K 1E6
Telephone: (519) 837-1881

Canadian Solar International Limited
Unit 1520, 15/F, Tower 2
Grand Century Place
193 Prince Edward Road West
MongKok, Kowloon, Hong Kong
People's Republic of China
Telephone: + 852-2528-1286

Canadian Solar Manufacturing (Changshu)
Co. Inc.
No. 2 Changsheng Road
YangYuan, Xinzhuang Town
Changshu, Jiangsu 215562
People's Republic of China
Telephone: +86-512-5247-7677

Canadian Solar Manufacturing (Luoyang) Inc.
2 Yingzhou Road, Luolong Science Park,
Luoyang, Henan Province, China
Telephone: +86-512-6269-6755

Robert Kent
Zhuanjia Gu
TURNER BOYD LLP
702 Marshall Street, Suite 640
Redwood City, California 94063
Telephone: (650) 521-5930

Canadian Solar Manufacturing (Thailand) Co.
Ltd.
168/2 Moo 4, Rojana Industrial Estate
Si Racha, Chon Buri 20230
Kingdom of Thailand
Telephone: +66-33-678-530

Canadian Solar Manufacturing Vietnam Co.
Ltd.
D11, No. 5, Dong Tay Road
VSIP Hai Phong Urban
Industrial and Service Park
Duong Quan Commune
Thuy Nguyen District
Hai Phong City
Socialist Republic of Vietnam
Telephone: +84-225-2299288

Canadian Solar Solutions, Inc.
545 Speedvale Avenue
Guelph, Ontario Canada
Telephone: (519) 837-1881

Canadian Solar Construction (USA) LLC
3000 Oak Road
Suite 300
Walnut Creek, California 94597
Telephone: (415) 675-1500

Canadian Solar (USA) Inc.
3000 Oak Road
Suite 400
Walnut Creek, California 94597
Telephone: (888) 998-7739

Recurrent Energy Group, Inc.
123 Mission Street
Floor 18
San Francisco, California 94105
Telephone: (415) 675-1500

Recurrent Energy LLC
3000 Oak Road
Suite 300
Walnut Creek, California 94597
Telephone: (415) 675-1500

Recurrent Energy SH Proco LLC
3000 Oak Road
Suite 400
Walnut Creek, California 94597
Telephone: (415) 675-1500

Hanwha Q CELLS & Advanced Materials
Corp.
86 Cheonggyecheon-ro, Jung-gu
Seoul, Republic of Korea 04541
Telephone: +82-1600-3400

Hanwha Q Cells GmbH
Sonnenallee 17 – 21 06766 Bitterfeld-Wolfen
Federal Republic of Germany
Telephone: +49-3494-6699-0

Hanwha Q Cells Malaysia Sdn. Bhd.
Lot 1, Jalan CV 2, Selangor Cyber Valley,
63300 Cyberjaya, Selangor Malaysia
Telephone: +60-3-83-15-00-00

Hanwha Q Cells (Qidong) Co., Ltd.
888 Linyang Road, Qidong Jiangsu 226200
People's Republic of China
Telephone: +86-513-8360-6222

Hanwha Solutions Corporation
24F, 86, Cheonggyecheon-ro, Jung-gu, Seoul,
Republic of Korea 04541
Telephone: +82-1600-3400

Hanwha Energy USA Holdings Corp.
(dba 174 Power Global Corporation)
300 Spectrum Center Dr.
Irvine, California 92618
Telephone: (833) 461-7474

Hanwha Q Cell EPC USA LLC
400 Spectrum Center Drive, Suite 1400
Irvine, California 92618 USA
Telephone: (949) 748-5996

Hanwha Q Cells America Inc.
400 Spectrum Center Drive, Suite 1400
Irvine, California 92618 USA
Telephone: (949) 748-5996

Hanwha Q Cells USA Corp.
300 Spectrum Center Drive, Suite 1250
Irvine, California 92618 USA
Telephone: (949) 748-5996

Hanwha Q Cells USA Inc.
300 Nexus Drive
Dalton, Georgia 30721
Telephone: (706) 671-3077

HQC Rock River Solar Holdings LLC
300 Spectrum Center Drive, Suite 1250
Irvine, California 92618
Telephone: (949) 748-5996

HQC Rock River Solar Power Generation
Station, LLC
3753 US-51
Beloit, Wisconsin 53511
Telephone: (800) 255-4268

Boviet Solar Technology Co., Ltd.
B5-B6, Song Khe-Industrial Zone
Noi Hoang District
Bac Giang Province
Socialist Republic of Vietnam
Telephone: +84-240-376-6288

Ningbo Boway Alloy Material Co., Ltd.
No. 1777 Yinzhou Dadao Dong Duan
Ningbo City
Zhejiang Province
People's Republic of China
Telephone: +86-400-9262-798

Boviet Renewable Power LLC
1740 Technology Drive
Suite 205
San Jose, California 95110
Telephone: (800) 246-2677

Boviet Solar USA Ltd.

2701 North 1st Street
Suite 550
San Jose, California 95131
Telephone: (877) 253-2858

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EXHIBIT LIST		
No.	Designation	Description
1	Public	Certified copy of U.S. Patent 8,450,599
2A	Public	Certified Assignment for the '599 Patent from Inventors to Bandgap Engineering, Inc.
2B	Public	Certified Assignment for the '599 Patent from Bandgap Engineering, Inc. to Massachusetts Green Energy Fund I LP; New Enterprise Associates 12, LP; Tracy Adams; Marcie R. Black; Richard Chleboski; Robert W. Shaw, Jr.; and Dane Shulman Associates, LLC
2C	Public	Certified Assignment for the '599 Patent from Massachusetts Green Energy Fund I LP; New Enterprise Associates 12, LP; Tracy Adams; Marcie R. Black; Richard Chleboski; Robert W. Shaw, Jr.; and Dane Shulman Associates, LLC to Advanced Silicon Group, Inc.
2D	Public	Certified Assignment for the '599 Patent from Advanced Silicon Group, Inc. to Advanced Silicon Group Technologies, LLC
3	Public	Certified copy of U.S. Patent 8,852,981
4A	Public	Certified Assignment for the '981 Patent from Inventors to Bandgap Engineering, Inc.
4B	Public	Certified Assignment for the '981 Patent from Bandgap Engineering, Inc. to Massachusetts Green Energy Fund I LP; New Enterprise Associates 12, LP; Tracy Adams; Marcie R. Black; Richard Chleboski; Robert W. Shaw, Jr.; and Dane Shulman Associates, LLC
4C	Public	Certified Assignment for the '981 Patent from Massachusetts Green Energy Fund I LP; New Enterprise Associates 12, LP; Tracy Adams; Marcie R. Black; Richard Chleboski; Robert W. Shaw, Jr.; and Dane Shulman Associates, LLC to Advanced Silicon Group, Inc.
4D	Public	Certified Assignment for the '981 Patent from Advanced Silicon Group, Inc. to Advanced Silicon Group Technologies, LLC
5	Public	Certified copy of U.S. Patent 9,601,640
6A	Public	Certified Assignment for the '640 Patent from Inventors to Bandgap Engineering, Inc.
6B	Public	Certified Assignment for the '640 Patent from Bandgap Engineering, Inc. to Massachusetts Green Energy Fund I

EXHIBIT LIST		
No.	Designation	Description
		LP; New Enterprise Associates 12, LP; Tracy Adams; Marcie R. Black; Richard Chleboski; Robert W. Shaw, Jr.; and Dane Shulman Associates, LLC
6C	Public	Certified Assignment for the '640 Patent from Massachusetts Green Energy Fund I LP; New Enterprise Associates 12, LP; Tracy Adams; Marcie R. Black; Richard Chleboski; Robert W. Shaw, Jr.; and Dane Shulman Associates, LLC to Advanced Silicon Group, Inc.
6D	Public	Certified Assignment for the '640 Patent from Advanced Silicon Group, Inc. to Advanced Silicon Group Technologies, LLC
7	Public	Certified copy of U.S. Patent 9,768,331
8A	Public	Certified Assignment for the '331 Patent from Inventors to Bandgap Engineering, Inc.
8B	Public	Certified Assignment for the '331 Patent from Bandgap Engineering, Inc. to Massachusetts Green Energy Fund I LP; New Enterprise Associates 12, LP; Tracy Adams; Marcie R. Black; Richard Chleboski; Robert W. Shaw, Jr.; and Dane Shulman Associates, LLC
8C	Public	Certified Assignment for the '331 Patent from Massachusetts Green Energy Fund I LP; New Enterprise Associates 12, LP; Tracy Adams; Marcie R. Black; Richard Chleboski; Robert W. Shaw, Jr.; and Dane Shulman Associates, LLC to Advanced Silicon Group, Inc.
8D	Public	Certified Assignment for the '331 Patent from Advanced Silicon Group, Inc. to Advanced Silicon Group Technologies, LLC
8E	Public	Confirmation and Correction to Asset Purchase Agreement
9	Public	Certified copy of U.S. Patent 10,269,995
10A	Public	Certified Assignment for the '995 Patent from Inventors to Bandgap Engineering, Inc.
10B	Public	Certified Assignment for the '995 Patent from Bandgap Engineering, Inc. to Massachusetts Green Energy Fund I LP; New Enterprise Associates 12, LP; Tracy Adams; Marcie R. Black; Richard Chleboski; Robert W. Shaw, Jr.; and Dane Shulman Associates, LLC
10C	Public	Certified Assignment for the '995 Patent from Massachusetts Green Energy Fund I LP; New Enterprise

EXHIBIT LIST		
No.	Designation	Description
		Associates 12, LP; Tracy Adams; Marcie R. Black; Richard Chleboski; Robert W. Shaw, Jr.; and Dane Shulman Associates, LLC to Advanced Silicon Group, Inc.
10D	Public	Certified Assignment for the '995 Patent from Advanced Silicon Group, Inc. to Advanced Silicon Group Technologies, LLC
10E	Public	Confirmation and Correction to Asset Purchase Agreement
11	Public	Certified copy of U.S. Patent 10,692,971
12A	Public	Certified Assignment for the '971 Patent from Inventors to Bandgap Engineering, Inc.
12B	Public	Certified Assignment for the '971 Patent from Bandgap Engineering, Inc. to Massachusetts Green Energy Fund I LP; New Enterprise Associates 12, LP; Tracy Adams; Marcie R. Black; Richard Chleboski; Robert W. Shaw, Jr.; and Dane Shulman Associates, LLC
12C	Public	Certified Assignment for the '971 Patent from Massachusetts Green Energy Fund I LP; New Enterprise Associates 12, LP; Tracy Adams; Marcie R. Black; Richard Chleboski; Robert W. Shaw, Jr.; and Dane Shulman Associates, LLC to Advanced Silicon Group, Inc.
12D	Public	Certified Assignment for the '971 Patent from Advanced Silicon Group, Inc. to Advanced Silicon Group Technologies, LLC
13	Public	Contact Information for Canadian Solar Entities
14	Public	Contact Information for Hanwha Entities
15	Public	Contact Information for Boviet Entities
16	Public	Canadian Solar CS3U-350PB-AG Datasheet
17	Public	Canadian Solar CS3W-410PB-AG Datasheet
18	Public	Hanwha Q.PLUS-G4.3 280 Datasheet
19	Public	Hanwha Q.PLUS-L-G4.2 345 Datasheet
20	Public	Boviet BVM6612P-330 Datasheet
21	Confidential	License Agreement Between ASGT and ASG Inc.
22	Public	Photograph of Canadian Solar CS3U-350PB-AG module
23	Public	Photograph of Canadian Solar CS3U-350PB-AG cell

EXHIBIT LIST		
No.	Designation	Description
24	Public	Photograph of Canadian Solar CS3W-410PB-AG module
25	Public	Photograph of Canadian Solar CS3W-410PB-AG cell
26	Confidential	Declaration of Marcie Black, PhD regarding Technical Analysis of Accused Products and Domestic Industry Product
27	Public	Infringement Claim Charts for Canadian Solar CS3U-350PB-AG
28	Public	Infringement Claim Charts for Canadian Solar CS3W-410PB-AG
29	Public	Canadian Solar SEC Form 20-F for the period ending December 31, 2020
30	Confidential	Order Confirmation of Canadian Solar CS3U-350PB-AG module purchase
31	Public	Canadian Solar CS3U-350PB-AG Label
32	Confidential	Order Confirmation of Canadian Solar CS3W-410PB-AG module purchase
33	Public	Canadian Solar CS3W-410PB-AG Label
34	Public	Photograph of Hanwha Q.PLUS-G4.3 280 module
35	Public	Photograph of Hanwha Q.PLUS-G4.3 280 cell
36	Public	Photograph of Hanwha Q.PLUS-L-G4.2 345 module
37	Public	Photograph of Hanwha Q.PLUS-L-G4.2 345 cell
38	Public	Infringement Claim Charts for the Hanwha Q.PLUS-G4.3 280 module
39	Public	Infringement Claim Charts for the Hanwha Q.PLUS-L-G4.2 345 module
40	Public	Hanwha Solutions Corporation Consolidated Financial Statements for years ended December 31, 2019 and 2018, Independent Auditors' Report
41	Confidential	Order Confirmation and Invoice of Hanwha Q-Cells Q.Plus-G4.3 280 module purchase
42	Public	Hanwha Q.PLUS-G4.3 280 packing materials

EXHIBIT LIST		
No.	Designation	Description
43	Public	Hanwha Q.PLUS-G4.3 280 Label
44	Confidential	Shipping Document for Hanwha Q.PLUS-L-G4.2 345 module purchase
45	Public	Hanwha Q.PLUS-L-G4.2 345 Label
46	Public	U.S. Customs and Border Protection Ship Manifest Data – Hanwha Q.PLUS-L-G4.2 345
47	Public	Photograph of Boviet BVM6612P-330 module
48	Public	Photograph of Boviet BVM6612P-330 cell
49	Public	Infringement Claim Charts for Boviet BVM6612P-330.
50	Public	Boviet Solar Technology Co. Ltd. January 27, 2021 S&P Capital IQ Report
51	Confidential	Sales Order Confirmation of Boviet BVM6612P-330 module purchase
52	Public	Boviet BVM6612P-330 Label
53	Confidential	Declaration of Marcie Black, Ph.D. regarding Domestic Industry
54	Confidential	Domestic Industry Claim Chart

APPENDICES	
Appendix No.	Description
Appendix A	Certified copy of File History for U.S. Patent 8,450,599
Appendix B	Copy of References Mentioned in Certified File History for U.S. Patent 8,450,599
Appendix C	Certified copy of File History for U.S. Patent 8,852,981
Appendix D	Copy of References Mentioned in Certified File History for U.S. Patent 8,852,981
Appendix E	Certified copy of File History for U.S. Patent 9,601,640
Appendix F	Copy of References Mentioned in Certified File History for U.S. Patent 9,601,640
Appendix G	Certified copy of File History for U.S. Patent 9,768,331
Appendix H	Copy of References Mentioned in Certified File History for U.S. Patent 9,768,331
Appendix I	Certified copy of File History for U.S. Patent 10,269,995
Appendix J	Copy of References Mentioned in Certified File History for U.S. Patent 10,269,995
Appendix K	Certified copy of File History for U.S. Patent 10,692,971
Appendix L	Copy of References Mentioned in Certified File History for U.S. Patent 10,692,971

I. INTRODUCTION

1. Advanced Silicon Group Technologies, LLC (“ASG Technologies,” “ASGT,” or “Complainant”) requests that the United States International Trade Commission institute an investigation pursuant to Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337 (“Section 337”), to remedy the unlawful importation, sale for importation, and/or sale after importation of certain silicon photovoltaic cells and modules with nanostructures and products containing the same that infringe valid and enforceable claims of United States patents ASGT owns (collectively, the “Accused Products”). “Products containing the same” refers to a photovoltaic module that is a power-generating unit, consisting of any number of photovoltaic cells.

2. The proposed Respondents are:

- a. Canadian Solar, Inc.; Canadian Solar International Limited; Canadian Solar Manufacturing (Changshu) Co. Inc.; Canadian Solar Manufacturing (Luoyang) Inc.; Canadian Solar Manufacturing (Thailand) Co. Ltd.; Canadian Solar Manufacturing Vietnam Co. Ltd.; Canadian Solar Solutions, Inc.; Canadian Solar Construction (USA) LLC; Canadian Solar (USA) Inc.; Recurrent Energy Group, Inc.; Recurrent Energy LLC; and Recurrent Energy SH Proco LLC (collectively, “Canadian Solar”);
- b. Hanwha Q Cells & Advanced Materials Corp.; Hanwha Q Cells GmbH; Hanwha Q Cells Malaysia Sdn. Bhd.; Hanwha Q Cells (Qidong) Co., Ltd.; Hanwha Solutions Corporation; Hanwha Energy USA Holdings Corp. (d/b/a 174 Power Global Corporation); Hanwha Q Cells EPC USA LLC; Hanwha Q Cells America Inc.; Hanwha Q Cells USA Corp.; Hanwha Q

Cells USA Inc.; HQC Rock River Solar Holdings LLC; and HQC Rock River Solar Power Generation Station, LLC (collectively, “Hanwha”).

- c. Boviet Solar Technology Co., Ltd.; Ningbo Boway Alloy Material Co., Ltd.; Boviet Renewable Power, LLC; and Boviet Solar USA Ltd. (collectively, “Boviet”).

3. On information and belief, Respondents have engaged in unfair acts in violation of Section 337 through and in connection with the unlicensed importation into the United States, sale for importation into the United States, and/or sale within the United States after importation of the Accused Products that infringe one or more claims of United States Patent No. 8,450,599 (’599 Patent), United States Patent No. 8,852,981 (’981 Patent), United States Patent No. 9,601,640 (’640 Patent), United States Patent No. 9,768,331 (’331 Patent), United States Patent No. 10,269,995 (’995 Patent), and United States Patent No. 10,692,971 (’971 Patent) (collectively, the “Asserted Patents”).¹

4. ASGT asserts that the Accused Products directly infringe on certain claims in the Asserted Patents, either literally or under the doctrine of equivalents. The specific claims of each patent are:

U.S. Patent No.	Asserted Claims
’599 Patent ²	15, 17, 23, 24, 25, and 27
’981 Patent	1, 2, 4, 13, 18, 23, 26, and 27
’640 Patent	1, 4, 11, 12, 13, 14, 16, 17, and 18
’331 Patent	1, 2, and 10
’995 Patent	1, 2, 7, 8, 9, 10, and 11
’971 Patent	1, 7, 8, 10, and 15

¹ Certified copies of the Asserted Patents are included as **Exhibits 1, 3, 5, 7, 9, and 11**.

² At this time, ASGT is not asserting claims 24 and 25 of the ’599 patent against Hanwha’s Q.PLUS-L-G4.2 345 module. ASGT reserves the right to assert in the future claims 24 and 25 against Hanwha’s Q.PLUS-L-G4.2 345 module.

5. ASGT owns, by assignment, the entire right, title, and interest in and to the '599 Patent, '981 Patent, '640 Patent, '331 Patent, '995 Patent, and '971 Patent.³ ASGT has licensed to Advanced Silicon Group, Inc. ("ASG Inc.") the right to practice the claimed inventions of the Asserted Patents. ASG Inc. is a Delaware corporation and is located at 600 Suffolk Road, Lowell, Massachusetts USA 01854. ASG Inc. is a cooperating participant to this litigation. ASG Inc. is currently the only licensee to the Asserted Patents.

6. As required by Sections 337(a)(2) and 337(a)(3), an industry exists in the United States relating to the Asserted Patents at least by virtue of ASG Inc.'s significant investment in plant and equipment, significant employment of labor and capital, and/or substantial investment in the exploitation of the Asserted Patents through activities including engineering and research and development. Alternatively, an industry is in the process of being established in the United States. ASG Inc.'s investments are related to the research, development, and commercialization in the United States of ASG Inc.'s photovoltaic biosensor that practices at least one claim of each of the Asserted Patents. The domestic industry developing ASG Inc.'s photovoltaic biosensors for use in various commercial applications is furthered detailed in Section IX, *infra*, and the materials cited therein.

7. ASGT seeks, as relief, a permanent limited exclusion order, pursuant to Section 337(d), excluding from entry into the United States all the Accused Products that infringe claims identified above. ASGT also seeks a permanent cease and desist order, pursuant to Section 337(f), directing all Respondents to cease and desist from activities that include, but are not limited to offering for sale, selling, importing, transferring, distributing, warehousing inventory for distribution, using, assembling, advertising, marketing, demonstrating, qualifying for use in

³ Exhibits 2A-2D, 4A-4D, 6A-6D, 8A-8E, 10A-10E, and 12A-12D are copies of the recorded assignment documents related to each of the Asserted Patents.

the products of others, testing, or installing the Accused Products or products containing the Accused Products that infringe the claims listed above. Finally, ASGT requests that the Commission impose a bond during the 60-day Presidential review period pursuant to 19 U.S.C. § 1337(e)(1) and (f)(1) to prevent further injury to the domestic industry of ASGT and its licensee ASG Inc. relating to the Asserted Patents.

II. COMPLAINANT

8. ASGT is the Complainant and is a Delaware limited liability company whose principal place of business is 600 Suffolk Road, Lowell, Massachusetts USA 01854.

III. PROPOSED RESPONDENTS

A. Canadian Solar

9. On information and belief, Canadian Solar, Inc. is a corporation existing under the federal laws of Canada with its principal place of business at 545 Speedvale Avenue West, Guelph, Ontario, Canada N1K 1EG. *See Exhibit 13* containing the supporting address information for Canadian Solar, Inc. and the other Canadian Solar entities identified below. Canadian Solar, Inc. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

10. On information and belief, Canadian Solar International Limited is wholly owned by Canadian Solar, Inc. and is a corporation existing under the laws of Hong Kong, People's Republic of China with a principal place of business at Unit 1520, 15/F, Tower 2, Grand Century Place, 193 Prince Edward Road West, MongKok, Kowloon, Hong Kong, People's Republic of China. Canadian Solar International Limited imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

11. On information and belief, Canadian Solar Manufacturing (Changshu) Co. Inc. manufactures silicon photovoltaic modules and is wholly owned by Canadian Solar, Inc.

Canadian Solar Manufacturing (Changshu) Co. Inc. is a corporation existing under the laws of the People's Republic of China with a principal place of business at No. 2 Changsheng Road, YangYuan, Xinzhuang Town, Changshu, Jiangsu 215562, People's Republic of China. Canadian Solar Manufacturing (Changshu) Co. Inc. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

12. On information and belief, Canadian Solar Manufacturing (Luoyang) Inc. manufactures silicon photovoltaic cells, modules, silicon ingots, and silicon wafers and is wholly owned by Canadian Solar, Inc. Canadian Solar Manufacturing (Luoyang) Inc. is a corporation existing under the laws of the People's Republic of China with a principal place of business at 2 Yingzhou Road, Luolong Science Park, Luoyang, Henan Province, People's Republic of China. Canadian Solar Manufacturing (Luoyang) Inc. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

13. On information and belief, Canadian Solar Manufacturing (Thailand) Co. Ltd. manufactures silicon photovoltaic cells and modules and is wholly owned by Canadian Solar, Inc. Canadian Solar Manufacturing (Thailand) Co. Ltd is a corporation existing under the laws of the Kingdom of Thailand with a principal place of business at 168/2 Moo 4, Rojana Industrial Estate, Si Racha, Chon Buri 20230, Kingdom of Thailand. Canadian Solar Manufacturing (Thailand) Co. Ltd. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

14. On information and belief, Canadian Solar Manufacturing Vietnam Co. Ltd. manufactures silicon photovoltaic modules and is wholly owned by Canadian Solar, Inc. Canadian Solar Manufacturing Vietnam Co. Ltd is a corporation existing under the laws of the Socialist Republic of Vietnam with a principal place of business at D11, No. 5, Dong Tay Road,

VSIP Hai Phong Urban, Industrial and Service Park, Duong Quan Commune, Thuy Nguyen District, Hai Phong City, Socialist Republic of Vietnam. Canadian Solar Manufacturing Vietnam Co. Ltd. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

15. On information and belief, Canadian Solar Solutions, Inc. provides solar power generation consulting services including development, marketing, engineering, and project management. Canadian Solar Solutions, Inc. serves as a foreign exporter and a U.S. importer of infringing silicon photovoltaics. Canadian Solar Solutions, Inc. is wholly owned by Canadian Solar, Inc. and is a corporation existing under the federal laws of Canada with a principal place of business at 545 Speedvale Avenue, Guelph, Ontario, Canada. Canadian Solar Solutions, Inc. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

16. On information and belief, Canadian Solar Construction (USA) LLC is wholly owned by Canadian Solar, Inc. Canadian Solar Construction (USA) LLC is a limited liability company existing under the laws of the State of Delaware with a principal place of business at 3000 Oak Road, Suite 300, Walnut Creek, California 94597. Canadian Solar Construction (USA) provides operating and maintenance services for solar farms. Canadian Solar Construction (USA) LLC is registered with the Secretary of State of California to conduct business in California. On information and belief, Canadian Solar Construction (USA) LLC imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

17. On information and belief, Canadian Solar (USA) Inc. is wholly owned by Canadian Solar, Inc. Canadian Solar (USA) Inc. is a corporation existing under the laws of the

State of Delaware with a principal place of business at 3000 Oak Road, Suite 400, Walnut Creek, California 94597. Canadian Solar (USA) Inc. is registered with the Secretary of State of California to conduct business in California. Canadian Solar (USA) Inc. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

18. On information and belief, Recurrent Energy Group, Inc. is wholly owned by Canadian Solar, Inc. and develops solar power projects. Recurrent Energy Group, Inc. is a corporation existing under the laws of State of Delaware and with its principal place of business at 123 Mission Street, Floor 18, San Francisco, California 95105 and maintaining offices at 3000 Oak Road, Suite 400, Walnut Creek, California 94597. Recurrent Energy Group, Inc. is registered with the Secretary of State of California to conduct business in California. On information and belief, Recurrent Energy Group, Inc. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

19. On information and belief, Recurrent Energy LLC is wholly owned by Canadian Solar, Inc. and develops solar power projects. Recurrent Energy LLC is a limited liability company existing under the laws of the State of Delaware and having a principal place of business at 3000 Oak Road, Suite 300, Walnut Creek, California 94597. Recurrent Energy LLC is registered with the Secretary of State of California to conduct business in California. On information and belief, Recurrent Energy LLC imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

20. On information and belief, Recurrent Energy SH Proco LLC is a limited liability company existing under the laws of the State of Delaware and having a principal place of business at 3000 Oak Road, Suite 400, Walnut Creek, California 94597. Recurrent Energy SH

Proco LLC is registered with the Secretary of State of California to conduct business in California. Recurrent Energy SH Proco LLC imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

B. Hanwha

21. On information and belief, Hanwha Q Cells & Advanced Materials Corp. is a corporation existing under the laws of the Republic of Korea with its principal place of business at 86 Cheonggyecheon-ro, Jung-gu, Seoul, Republic of Korea 04541. *See Exhibit 14* containing the supporting address information for Hanwha Q Cells & Advanced Material Corporation and the other Hanwha entities identified below. Hanwha Q Cells & Advanced Materials Corporation is part of the Hanwha group of companies that imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

22. On information and belief, Hanwha Q Cells GmbH is part of the Hanwha group of companies, and is a corporation existing under the laws of the Federal Republic of Germany with a principal place of business at Sonnenallee 17 – 21 06766 Bitterfeld-Wolfen, Federal Republic of Germany. Hanwha Q Cells GmbH imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

23. On information and belief, Hanwha Q Cells Malaysia Sdn. Bhd. is part of the Hanwha group of companies and is a corporation existing under the laws of the Republic of Malaysia with a principal place of business at Lot 1, Jalan CV 2, Selangor Cyber Valley, 63300 Cyberjaya, Selangor, Malaysia. Hanwha Q Cells Malaysia Sdn. Bhd. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

24. On information and belief, Hanwha Q Cells (Qidong) Co., Ltd is part of the Hanwha group of companies and is a corporation existing under the laws of the Peoples’

Republic of China with a principal place of business at 888 Linyang Road, Qidong Jiangsu 226200, Peoples' Republic of China. Hanwha Q Cells (Qidong) Co., Ltd. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

25. On information and belief, Hanwha Solutions Corporation is a subsidiary of Hanwha Corporation. Hanwha Solutions Corporation is a corporation existing under the laws of the Republic of Korea with a principal place of business at 24F, 86, Cheonggyecheon-ro, Jung-gu, Seoul, Republic of Korea 04541. On information and belief, Hanwha Solutions Corp., or through its affiliates, imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

26. On information and belief, Hanwha Energy USA Holdings Corp. (d/b/a 174 Power Global Corporation) is part of the Hanwha group of companies, and is a corporation existing under the laws of the State of Delaware with a principal place of business at 300 Spectrum Center Drive, Irvine, California 92618. Hanwha Energy USA Holdings Corp. (d/b/a 174 Power Global Corporation) is involved in solar project development in the United States. Hanwha Energy USA Holdings Corp. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

27. On information and belief, Hanwha Q Cells EPC USA LLC is part of the Hanwha group of companies and is a limited liability company existing under the laws of the State of Delaware with a principal place of business at 400 Spectrum Center Drive, Suite 1400 Irvine, California 92618. Hanwha Q Cells EPC USA LLC imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

28. On information and belief, Hanwha Q Cells America, Inc. is part of the Hanwha group of companies, and is a corporation existing under the laws of the State of California with a principal place of business at 400 Spectrum Center Drive, Suite 1400, Irvine, California 92618. Hanwha Q Cells America, Inc. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

29. On information and belief, Hanwha Q Cells USA Corp. is part of the Hanwha group of companies, and is a corporation existing under the laws of the State of Nevada with a principal place of business at 300 Spectrum Center Drive, Suite 1250, Irvine, California 92618. Hanwha Q Cells USA Corp. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

30. On information and belief, Hanwha Q Cells USA Inc. is part of the Hanwha group of companies, and is a corporation existing under the laws of the State of Delaware with a principal place of business at 300 Nexus Drive, Dalton, Georgia 30721. Hanwha Q Cells USA Inc. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

31. On information and belief, HQC Rock River Solar Holdings LLC is part of the Hanwha group of companies and is a limited liability company existing under the laws of the State of Delaware with a place of business at 300 Spectrum Center Drive, Suite 1250, Irvine, California 92618. HQC Rock River Solar Holdings LLC is involved in solar photovoltaic power activities. On information and belief, HQC Rock River Solar Holdings LLC directly or indirectly imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

32. On information and belief, HQC Rock River Solar Power Generation Station, LLC is part of the Hanwha group of companies, and is a limited liability company existing under the laws of the State of Delaware with a principal place of business at 3753 US-51, Beloit, Wisconsin 53511. HQC Rock River Solar Power Generation Station, LLC is involved in solar photovoltaic power activities. On information and belief, HQC Rock River Solar Power Generation Station, LLC directly or indirectly imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

C. Boviet

33. On information and belief, Boviet Solar Technology Co., Ltd. is a corporation existing under the laws of the Socialist Republic of Vietnam with a principal place of business at B5-B6, Song Khe-Industrial Zone, Noi Hoang District, Bac Giang Province, Socialist Republic of Vietnam. See **Exhibit 15** containing the supporting address information for Boviet Solar Technology Co., Ltd. and the other Boviet entities identified below. Boviet Solar Technology Co., Ltd. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products. On information and belief, Ningbo Boway Alloy Material Co., Ltd. is a Chinese public company listed on the Shanghai stock exchange. Ningbo Boway Alloy Material Co., Ltd. is the ultimate parent company for entities affiliated with the Boviet group of companies with its principal place of business at No. 1777 Yinzhou Dadao Dong Duan, Ningbo City, Zhejiang Province, People's Republic of China. Ningbo Boway Alloy Material Co., Ltd. is a corporation existing under the laws of the People's Republic of China. On information and belief, Ningbo Boway Alloy Material Co., Ltd., or through its affiliates, imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

34. On information and belief, Boviet Renewable Power LLC is part of the Boviet group of companies, and is a corporation existing under the laws of the State of Delaware with a principal place of business at 1740 Technology Drive, Suite 205, San Jose, California 95110. On information and belief, Boviet Renewable Power LLC directly or indirectly imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

35. On information and belief, Boviet Solar USA Ltd. is part of the Boviet group of companies, and is a corporation existing under the laws of the State of Delaware with a principal place of business at 2701 North 1st Street, Suite 550, San Jose, California 95131. Boviet Solar USA Ltd. imports into the United States, sells for importation, and/or sells within the United States after importing the Accused Products.

IV. THE ACCUSED PRODUCTS

36. Pursuant to 19 C.F.R. § 210.12(a)(12), the category of the Accused Products may be plainly described as silicon photovoltaic cells and modules containing such cells—made by or for Respondents—in which at least one surface of the silicon photovoltaic cell has nanostructures. Section VI, *infra*, details specific instances of the unlawful importation, sale for importation and/or sale after importation of Respondents' Accused Products.

37. The Canadian Solar Accused Products include, but are not limited to, Canadian Solar's modules CS3U-350PB-AG and CS3W-410PB-AG. Datasheets for these modules are attached as **Exhibits 16** and **17**, respectively.

38. The Hanwha Accused Products include, but are not limited to, models Hanwha's modules Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345. Datasheets for these modules are attached as **Exhibits 18** and **19**, respectively.

39. The Boviet Accused Products include, but are not limited to, Boviet's module BVM6612P-330. A datasheet for this module is attached as **Exhibit 20**.

40. This identification of exemplary modules and types of products for each Respondent is intended purely for illustration and is not intended to limit the scope of the investigation. Any remedy should extend to all present and future infringing products of each Respondent, including products made by a named Respondent for third parties and sold under third-party brand names, regardless of model number or type of product.

V. THE PATENTS-AT-ISSUE

A. U.S. Patent No. 8,450,599

1. Identification of the patent and ownership by ASGT

41. U.S. Patent No. 8,450,599, titled "Nanostructured Devices," was filed on November 16, 2009 as U.S. Patent Application No. 12/619,092 and issued on May 28, 2013. The '599 Patent claims the benefit of priority to U.S. Provisional Application No. 61/114,896, filed November 14, 2008; U.S. Provisional Application No. 61/157,386, filed March 4, 2009; and U.S. Provisional Application No. 61/250,418, filed October 9, 2009. The '599 Patent is subject to a patent term adjustment of 388 days with no terminal disclaimer. Accordingly, the '599 Patent will expire on December 9, 2030. The '599 Patent identifies Brent A. Buchine, Marcie R. Black, and Faris Modawar as the inventors.

42. As required by Rule 210.12(c), **Appendix A** to this Complaint includes a certified copy of the prosecution history of the '599 Patent. **Appendix B** to this Complaint includes the applicable pages of each technical reference mentioned in the certified prosecution history of the '599 Patent.

43. ASGT is the sole owner by assignment of all right, title, and interest to the '599 Patent. A copy of the assignment record for the '599 Patent is attached hereto as **Exhibits 2A-**

2D. The '599 Patent is valid, enforceable, and is currently in full force and effect. ASGT has licensed the '599 Patent to ASG Inc. under an exclusive license agreement in the field of use not including solar photovoltaics. **Exhibit 21.**

2. Non-technical description of the invention of the '599 Patent

44. The '599 Patent relates to an improved version of a photovoltaic cell, also known as a "solar cell." '599 Patent, 2:53-55. A photovoltaic cell is made of a special type of silicon that absorbs light, typically sunlight, to produce electricity. The photovoltaic cells of the '599 Patent have extremely small protruding features called "nanostructures" on the surface of the silicon, which enhance the absorption of light by the silicon, thereby increasing the amount of electricity that is produced. *Id.*, 1:52-54. One type of nanostructure is a "nanowire," so named because the protruding feature has at least two dimensions in the nanometer scale.

45. The silicon in photovoltaic cells typically contains impurities that are arranged in certain spatial patterns to create an electric field within the silicon. The electric field causes the electrons that are liberated upon the absorption of sunlight to flow as a useful electric current. The region in the silicon that contains positively charged impurities (*i.e.*, p-dopants) is referred to as the "p-type region" or "p-doped region," whereas the region in the silicon that contains negatively charged impurities (*i.e.*, n-dopants) is referred to as the "n-type region" or "n-doped region." Typically, the p-type and n-type regions are contiguous, and the region in which they meet in the silicon is referred to as the "p-n junction." *Id.*, 1:35-37.

46. Previous attempts to develop photovoltaic cells using nanostructures on the surface of the silicon have included nanowire-based devices with various doping configurations of p-type and n-type regions. Examples include undoped nanowires not aligned with or in electrical contact with the bulk silicon (*id.*, 1:66-2:2), nanowires with concentric n-type and p-type regions, (*id.*, 2:8-9), and nanowires with distinct p-type and n-type sections of wire (*id.*,

2:15-17). Such designs suffer from various deficiencies, including undesirably large leakage current and limitations due to surface recombination and carrier transport. *Id.*, 1:66-2:46.

47. The '599 Patent discloses a nanostructured photovoltaic device that can be manufactured at a lower cost while still exhibiting high efficiency compared to prior photovoltaic cells. In one exemplary embodiment, the photovoltaic device includes a crystalline semiconductor substrate with a bottom p-doped region and a top n-doped region adjacent to and in contact with the p-doped region. N-doped nanowires are in contact with the top n-doped region of the crystalline semiconductor substrate. Furthermore, the n-doped and p-doped regions form a p-n junction within the bulk of the crystalline semiconductor substrate, such that the p-n junction is located at least about 30 nm from the bottom of the nanowires.

3. Foreign counterparts to the '599 Patent

48. Pursuant to Commission Rule 210.12(a)(9)(v), a list of all foreign patents and foreign patent applications corresponding to the '599 patent is set forth in the table below.

Patent/ Patent Application	Country	Status
AU2009314576	Australia	Granted
CA2743743 (A1)	Canada	Abandoned
CN102282679 (B)	China	Granted
EP2351100 (B1)	Europe	Granted
EP3664158 (A1)	Europe	Published
KR20110098910 (A)	Korea	Abandoned
PT2351100 (T)	Portugal	Granted
WO2010056352 (A2)	International Application	Expired

B. U.S. Patent No. 8,852,981

1. Identification of the patent and ownership by ASGT

49. U.S. Patent No. 8,852,981, titled "Electrical Contacts to Nanostructured Areas," was filed on September 19, 2012 as U.S. Patent Application No. 13/622,864 and issued on October 7, 2014. The '981 Patent claims the benefit of priority to U.S. Provisional Application

No. 61/536,243, filed September 19, 2011. The '981 Patent is subject to 140 days of patent term adjustment with no terminal disclaimers. Accordingly, the '981 Patent will expire on February 6, 2033. The '981 Patent identifies Marcie R. Black, Joanne Forziati, Michael Jura, Jeff Miller, Brian Murphy, and Adam Standley as the inventors.

50. As required by Rule 210.12(c), **Appendix C** to this Complaint includes a certified copy of the prosecution history of the '981 Patent. **Appendix D** to this Complaint includes the applicable pages of each technical reference mentioned in the certified prosecution history of the '981 Patent.

51. ASGT is the sole owner by assignment of all right, title, and interest in the '981 Patent. A copy of the assignment record for the '981 Patent is attached hereto as **Exhibits 4A-4D**. The '981 Patent is valid, enforceable, and is currently in full force and effect. ASGT has licensed the '981 Patent to ASG Inc. under an exclusive license agreement in the field of use not including solar photovoltaics. **Exhibit 21**.

2. Non-technical description of the invention of the '981 Patent

52. When silicon is used to produce electricity in a photovoltaic cell, it is necessary to provide electrical contacts to either side of the p-n junction of the silicon to collect the electrical current for later use. '981 Patent, 1:29-32. For example, electrical contacts in the form of metal strips may be provided to the frontside and backside of the silicon substrate. If the silicon has a nanostructured frontside surface, however, forming good conductive contacts between the metal strips and the nanostructures can be difficult. *Id.*, 1:33-38. For example, when the nanostructures are nanowires, the contact area between the nanowire tips and the metal strip may be very small, leading to an undesirably high contact resistance. *Id.* High contact resistance adversely impacts the efficiency of the photovoltaic device. *Id.*, 1:42-43.

53. The '981 Patent provides an improved process for forming electrical contacts on nanostructured silicon surfaces. In an embodiment of the invention, the process begins with a conductive substrate (*e.g.*, silicon) having a nanostructured surface that may be coated with an electrically insulating material. The nanostructures are removed (either completely or partially) from a portion of the surface of the substrate, and an electrically conductive contact is deposited in the area where the nanostructures were removed. *Id.*, 2:41-55.

3. Foreign counterparts to the '981 Patent

54. Pursuant to Commission Rule 210.12(a)(9)(v), a list of all foreign patents and foreign patent applications corresponding to the '981 patent is set forth in the table below.

Patent/ Patent Application	Country	Status
CN104145323	China	Abandoned
EP2758988	Europe	Abandoned
JP2014531757	Japan	Abandoned
TW201330294	Taiwan	Abandoned
WO2013043730	International Application	Expired

C. U.S. Patent No. 9,601,640

1. Identification of the patent and ownership by ASGT

55. U.S. Patent No. 9,601,640, titled "Electrical Contacts to Nanostructured Areas," was filed on August 25, 2014 as U.S. Patent Application No. 14/468,219 and issued on March 21, 2017. The '640 Patent claims the benefit of priority to U.S. Provisional Application No. 61/536,243, filed September 19, 2011 and to U.S. Patent Application No. 13/622,864 filed September 19, 2012. The '640 Patent is subject to 249 days of patent term adjustment with no terminal disclaimers. Accordingly, the '640 Patent will expire on May 26, 2033. The '640 Patent identifies Marcie R. Black, Joanne Forziati, Michael Jura, Jeffrey Miller, Brian Murphy, and Adam Standley as the inventors.

56. As required by Rule 210.12(c), **Appendix E** to this Complaint includes a certified copy of the prosecution history of the '640 Patent. **Appendix F** to this Complaint includes the applicable pages of each technical reference mentioned in the certified prosecution history of the '640 Patent.

57. ASGT is the sole owner by assignment of all right, title, and interest in the '640 Patent. A copy of the assignment record for the '981 Patent is attached hereto as **Exhibits 6A-6D**. The '640 Patent is valid, enforceable, and is currently in full force and effect. ASGT has licensed the '640 Patent to ASG Inc. under an exclusive license agreement in the field of use not including solar photovoltaics. **Exhibit 21**.

2. Non-technical description of the invention of the '640 Patent

58. When silicon is used to produce electricity in a photovoltaic cell, it is necessary to provide electrical contacts to either side of the p-n junction of the silicon to collect the electrical current for later use. '640 Patent, 1:32-33. For example, electrical contacts in the form of metal strips may be provided to the frontside and backside of the silicon substrate. However, if the silicon has a nanostructured frontside surface, forming good conductive contacts between the metal strips and the nanostructures can be difficult. *Id.*, 1:36-40. For example, when the nanostructures are nanowires, the contact area between the nanowire tips and the metal strip may be very small, leading to an undesirably high contact resistance. *Id.* High contact resistance adversely impacts the efficiency of the photovoltaic device. *Id.*, 1:44-45.

59. The '640 Patent provides an improved process for forming electrical contacts on nanostructured silicon surfaces. In an embodiment of the invention, the process begins with a conductive substrate (*e.g.*, silicon) having a nanostructured surface that may be coated with an electrically insulating material. The nanostructures are removed (either completely or partially)

from a portion of the surface of the substrate, and an electrically conductive contact is deposited in the area where the nanostructures were removed. *Id.*, 2:43-57.

60. Silicon surfaces with nanostructure features are used in a variety of applications including photovoltaic cells and require electrical contacts to an external circuit. *Id.*, 1:13-15. One contact must be connected to the surface with the nanostructures, on one side of a p-n junction, and another contact connected to the substrate below the nanostructures, on the other side of the p-n junction, so that the cell can deliver electricity to a home, a business, or an electrical grid. *Id.*, 1:46-52. The '640 Patent provides an improved process for contacting nanostructures on a surface of an optoelectronic device. *Id.*, 2: 38-39.

3. Foreign counterparts to the '640 Patent

61. Pursuant to Commission Rule 210.12(a)(9)(v), a list of all foreign patents and foreign patent applications corresponding to the '640 patent is set forth in the table below.

Patent/ Patent Application	Country	Status
CN104145323	China	Abandoned
EP2758988	Europe	Abandoned
JP2014531757	Japan	Abandoned
TW201330294	Taiwan	Abandoned
WO2013043730	International Application	Expired

D. U.S. Patent No. 9,768,331

1. Identification of the patent and ownership by ASGT

62. U.S. Patent No. 9,768,331, titled "Screen Printing Electrical Contact to Nanowire Areas," was filed on July 23, 2014 as U.S. Patent Application No. 14/338,752 and issued on September 19, 2017. The '331 Patent is a continuation of International Application No. PCT/US2013/025958, filed on February 13, 2013, and claims the benefit of priority to U.S. Provisional Application No. 61/598,717, filed February 14, 2012. The '331 Patent is subject to 288 days of patent term adjustment but is subject to a terminal disclaimer. Accordingly, the

expiration date of the '331 Patent is February 13, 2033. The '331 Patent identifies Michael Jura, Marcie R. Black, Jeffrey B. Miller, Joanne Yim, Joanne Forziati, Brian P. Murphy, and Richard Chleboski as the inventors.

63. As required by Rule 210.12(c), **Appendix G** to this Complaint includes a certified copy of the prosecution history of the '331 Patent. **Appendix H** to this Complaint includes the applicable pages of each technical reference mentioned in the certified prosecution history of the '331 Patent.

64. ASGT is the sole owner by assignment of all right, title, and interest in the '331 Patent. The '331 Patent is valid, enforceable, and is currently in full force and effect. A copy of the assignment record for the '981 Patent is attached hereto as **Exhibits 8A-8E**. ASGT has licensed the '331 Patent to ASG Inc. under an exclusive license in the field of use not including solar photovoltaics. **Exhibit 21**.

2. Non-technical description of the invention of the '331 Patent

65. Screen printing is a common technique for forming electrical contacts on the surfaces of conventional (*i.e.*, not nanostructured) silicon substrates. '331 Patent, 1:61-63. In such screen printing processes, typically a mask with holes that define the desired shape of the electrical conductors (*i.e.*, the “screen”) is placed upon the surface of a silicon substrate. *Id.*, 1:65-2:6. A metallic paste (*e.g.*, a silver paste), is applied on the top surface of the screen. *Id.* The metallic paste is forced through the screen by running a metal or polymer squeegee across the screen, thereby printing patterns of the metallic paste on the surface of the silicon substrate. *Id.*, 2:3-6. Subsequent heating steps drive off the solvents in the metallic paste and diffuse at least some of the metal into the silicon substrate to form a conductive junction with desirably low contact resistance. *Id.*, 2:6-9.

66. Screen printing on nanostructured silicon surfaces, however, presents challenges. For example, if the silicon surface has nanowires, the nanowires may break or bend when the squeegee is moved across the surface of the cell to remove excess screen-printing paste during screen printing. *Id.*, 2:29-32. In addition, the nanowires might not survive the high temperatures required to drive off the organic materials in the screen-printing paste. *Id.*, 2:32-35.

67. The '331 Patent relates to a nanostructured silicon device with screen printed electrical contacts. The '331 Patent discloses that relatively short nanowires provide desirable anti-reflection and scattering properties, while being compatible with a screen-printing process. *Id.*, 3:57-64. The '331 Patent describes a device that has a nanostructured area that is in contact with the surface of the substrate. *Id.*, 8:21-29 (claim 1). The nanostructured area has a passivating layer and one or more contacts comprising a comb-like pattern of metal that directly contacts the nanostructured area. *Id.* A p-n junction is located below the nanostructured area. *Id.*

3. Foreign counterparts to the '331 Patent

68. Pursuant to Commission Rule 210.12(a)(9)(v), a list of all foreign patents and foreign patent applications corresponding to the '331 patent is set forth below.

Patent/ Patent Application	Country	Status
WO2013123066	International Application	Expired

E. U.S. Patent No. 10,269,995

1. Identification of the patent and ownership by ASGT

69. U.S. Patent No. 10,269,995, titled “Screen Printing Electrical Contacts to Nanostructured Areas,” was filed on June 14, 2017 as U.S. Patent Application No. 15/622,422 and issued on April 23, 2019. The '995 Patent is a continuation of U.S. Application No. 14/338,752, filed on July 23, 2014, which issued as the '331 Patent. As noted above, the '331 Patent is a continuation of International Application No. PCT/US2013/025958, filed on February

13, 2013, and claims the benefit of priority to U.S. Provisional Application No. 61/598,717, filed February 14, 2012, which is a continuation of application No. PCT/US2013/025958, filed on Feb. 13, 2013, and contains a terminal disclaimer with the '331 patent. The '995 Patent claims priority to provisional application No. 61/598,717 filed on Feb. 14, 2012. The '995 Patent is not subject to any patent term adjustment, but is subject to a terminal disclaimer over the '331 Patent. Accordingly, the '995 Patent will expire on February 13, 2033. The '995 Patent identifies Michael Jura, Marcie R. Black, Jeffrey B. Miller, Joanne Yim, Joanne Forziati, Brian P. Murphy, and Richard Chleboski as the inventors.

70. As required by Rule 210.12(c), **Appendix I** to this Complaint includes a certified copy of the prosecution history of the '995 Patent. **Appendix J** to this Complaint includes the applicable pages of each technical reference mentioned in the certified prosecution history of the '995 Patent.

71. ASGT is the sole owner by assignment of all right, title, and interest in the '995 Patent. The '995 Patent is valid, enforceable, and is currently in full force and effect. A copy of the assignment record for the '981 Patent is attached hereto as **Exhibits 10A-10E**. ASGT has licensed the '995 Patent to ASG Inc. under an exclusive license in the field of use not including solar photovoltaics. **Exhibit 21**.

2. Non-technical description of the invention of the '995 Patent

72. When a silicon substrate with a nanostructured surface is used in a photovoltaic cell, electrical contacts to an external circuit are required to collect the electricity generated by the nanostructured silicon. '995 Patent, 1:63-66. The '995 Patent provides an improved device with robust electrical contacts to a nanostructured silicon substrate. *Id.*, 8:9-20 (claim 1).

73. For example, the '995 Patent discloses a silicon device with nanostructures disposed on the surface of the substrate. The nanostructures are coated with a passivating layer

that comprises either aluminium oxide, silicon dioxide, or silicon nitride. A p-n junction is located below the nanostructures. A first contact comprising a comb-like pattern of metal is in contact with the nanostructures, and a second contact in electrical contact with the substrate. *Id.*, 8:9-20 (claim 1). The comb-like pattern may be formed by screen printing. *Id.*, 2:52-57.

3. Foreign counterparts to the '995 Patent

74. Pursuant to Commission Rule 210.12(a)(9)(v), a list of all foreign patents and foreign patent applications corresponding to the '995 patent is set forth in the table below.

Patent/ Patent Application	Country	Status
WO2013123066 (A1)	International Application	Expired

F. U.S. Patent No. 10,692,971

1. Identification of the patent and ownership by ASGT

75. U.S. Patent No. 10,692,971, titled “Process for Fabricating Silicon Nanostructures,” was filed on August 3, 2018 as U.S. Patent Application No. 16/054,457 and issued on June 23, 2020. The '971 Patent was filed as a continuation application of U.S. Patent Application No. 15/826,005, filed November 29, 2017 (now abandoned), which in turn is a divisional application of U.S. Patent Application No. 14/924,273, filed on October 27, 2015 (now U.S. Patent No. 9,859,366). U.S. Patent Application No. 14/924,273 is a continuation application of U.S. Patent Application No. 14/444,361, filed July 28, 2014 (now U.S. Patent No. 9,202,868), which is a continuation application of U.S. Patent Application No. 13/305,649, filed November 28, 2011 (now U.S. Patent No. 8,791,449). In turn, U.S. Patent Application No. 13/305,649 is a continuation application U.S. Patent Application No. 12/423,623, filed April 14, 2009 (now U.S. Patent No. 8,143,143). In addition, the '971 Patent claims the benefit of priority to U.S. Provisional Application Nos. 61/114,082 (filed on December 29, 2008) and 61/044,573

(filed April 14, 2008). The '971 Patent is not subject to any patent term adjustment or terminal disclaimer. Accordingly, the '971 Patent will expire on April 14, 2029. The '971 Patent identifies Brent A. Buchine, Marcie R. Black, and Faris Modawar as the inventors.

76. As required by Rule 210.12(c), **Appendix K** to this Complaint includes a certified copy of the prosecution history of the '971 Patent. **Appendix L** to this Complaint includes the applicable pages of each technical reference mentioned in the certified prosecution history of the '971 Patent.

77. ASGT is the sole owner by assignment of all right, title, and interest in the '971 Patent. The '971 Patent is valid, enforceable, and is currently in full force and effect. A copy of the assignment record for the '981 Patent is attached hereto as **Exhibits 12A-12D**. ASGT has licensed the '971 Patent to ASG Inc. under an exclusive license agreement in the field of use not including solar photovoltaics. **Exhibit 21**.

2. Non-technical description of the invention of the '971 Patent

78. Crystalline silicon is comprised of an ordered network of silicon atoms. Polycrystalline silicon, also known as “polysilicon,” is made up of more than one grain of crystalline silicon. The surfaces of these grains typically have different orientations and therefore different crystalline structures. These structural differences can cause the surfaces to exhibit different re-activities towards a given chemical reagent. For this reason, the surface of a polysilicon substrate is “typically more difficult to texture and structure than single crystal silicon due to the random orientation of the grains.” '971 Patent, 6:31-34.

79. The '971 Patent relates to a chemical process for forming nanostructures on the surface of a polycrystalline silicon (*i.e.*, polysilicon) substrate. *Id.*, 2:49-51. The process is advantageous at least because “[p]olysilicon is a cheaper material than crystalline silicon.” *Id.*,

6:31-32. The process of the '971 Patent “can be used to texture the surface of and/or form nanowires in polysilicon.” *Id.*, 6:29-31.

80. In one exemplary embodiment, the process involves depositing metal on the surface of a polycrystalline silicon substrate and contacting the pattern of metal with an etchant aqueous solution to form polycrystalline silicon nanostructures (*see, e.g.*, '971 Patent, Figure 1):

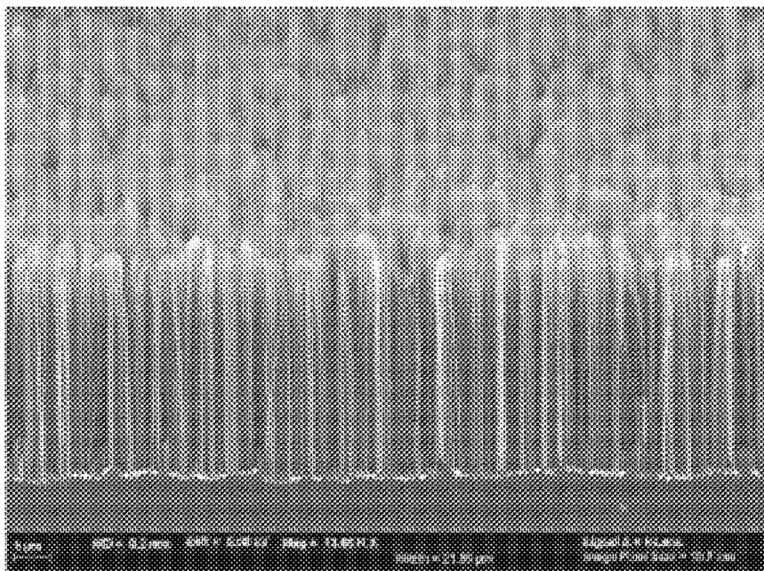


Figure 1 of the '971 Patent

81. The aqueous etchant solution may include, for example hydrofluoric acid (HF) and an oxidizing agent. *Id.*, 2:23-31 and 2:49-57. The method may also include the step of forming a p-n junction within the substrate. *Id.*, 5:65-6:1. The process of the '971 Patent may be used to texture polysilicon surfaces for a variety of applications, including photovoltaic cells, photodetectors, and photodiodes. *Id.*, 6:6-41.

3. Foreign counterparts to the '971 Patent

82. Pursuant to Commission Rule 210.12(a)(9)(v), a list of all foreign patents and foreign patent applications corresponding to the '971 patent is set forth in the table below.

Patent/ Patent Application	Country	Status
CN102084467 (A)	China	Abandoned

Patent/ Patent Application	Country	Status
EP2277045 (A4)	Europe	Abandoned
JP2011523902 (A)	Japan	Abandoned
WO2009137241 (A2)	International Application	Expired

VI. UNLAWFUL AND UNFAIR ACTS - PATENT INFRINGEMENT

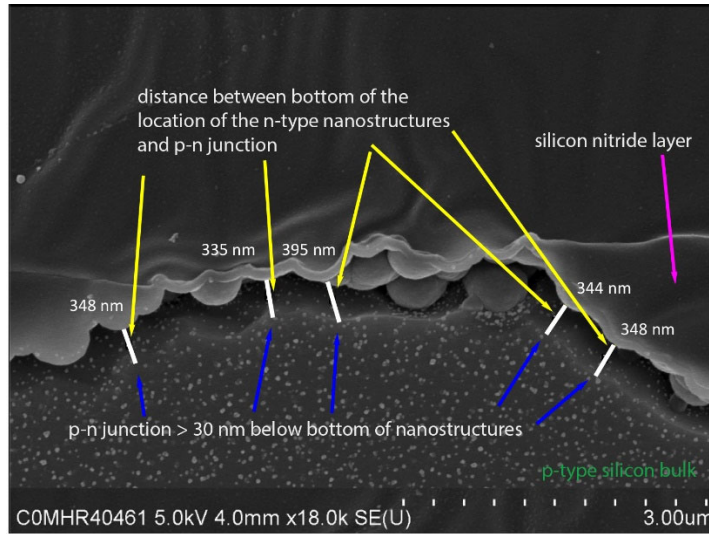
A. Canadian Solar

1. Representative involved articles

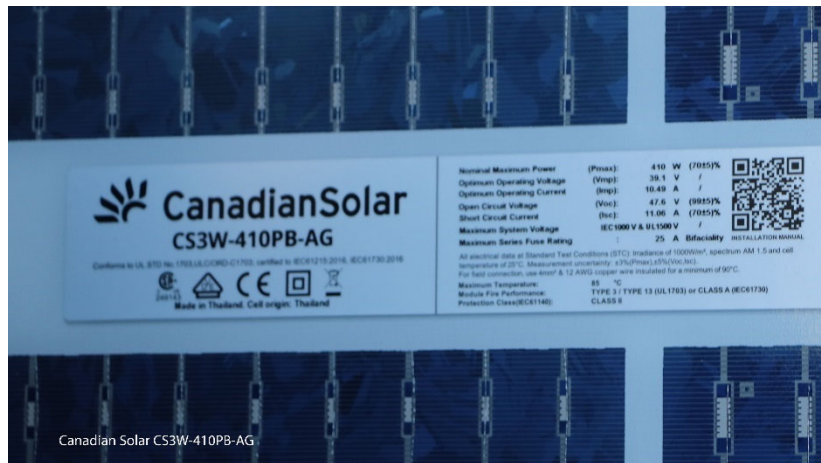
83. An exemplary Canadian Solar Accused Product that infringes the Asserted Patents is the CS3U-350PB-AG module. It is pictured below in Figure 1. **Exhibit 22.**



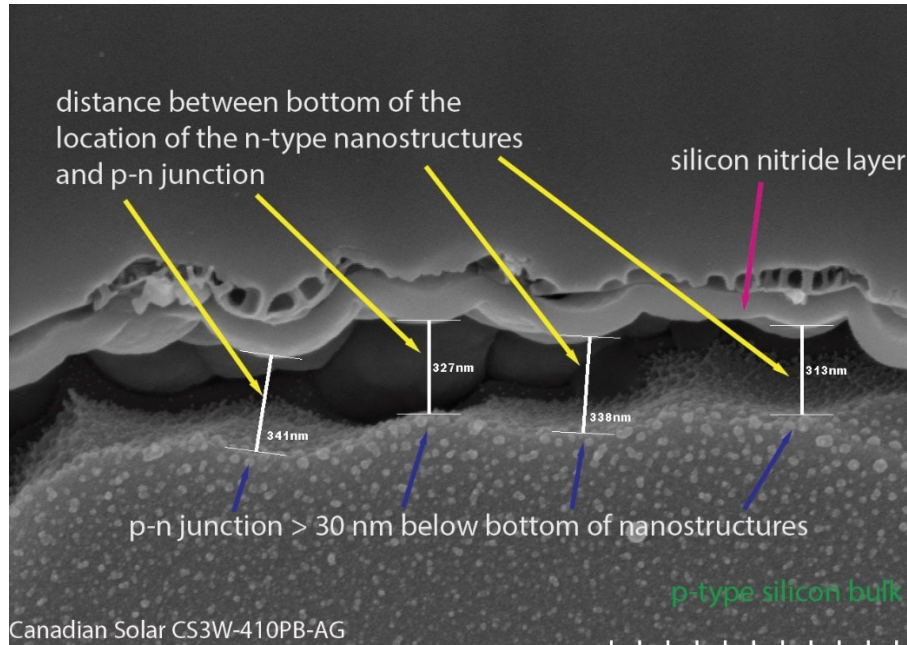
84. A representative cell from the Canadian Solar CS3U-350PB-AG module that infringes the Asserted Patents includes a plurality of nanostructures on a silicon substrate comprising a p-n junction within the bulk of the substrate, where the p-n junction is at least 30 nm from the bottom of the nanostructures. A representative cell is pictured in Figure 2 below. **Exhibit 23.**



85. An exemplary Canadian Solar Accused Product that infringes the Asserted Patents is the CS3W-410PB-AG module. It is pictured in Figure 3 below **Exhibit 24**.



86. A representative cell from the Canadian Solar CS3W-410PB-AG module that infringes the Asserted Patents includes a plurality of nanostructures on a silicon substrate comprising a p-n junction within the bulk of the substrate, where the p-n junction is at least 30 nm from the bottom of the nanostructures. A representative cell is pictured in Figure 4 below. **Exhibit 25**.



87. On information and belief, the exemplary Canadian Solar CS3W-410PB-AG and CS3U-350PB-AG modules are representative of many other infringing Canadian Solar photovoltaics manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Canadian Solar, and that include the same or substantially similar features as the exemplary Canadian Solar CS3U-350PB-AG and CS3W-410PB-AG modules. Accordingly, on information and belief, ASGT alleges that numerous Canadian Solar products including the exemplary Canadian Solar CS3U-350PB-AG and CS3W-410PB-AG modules infringe at least:

- claims 15, 17, 23, 24, 25, and 27 of the '599 Patent;
- claims 1, 2, 4, 13, 18, 23, 26, and 27 of the '981 Patent;
- claims 1, 4, 11, 12, 13, 14, 16, 17, and 18 of the '640 Patent;
- claims 1, 2, and 10 of the '331 Patent;
- claims 1, 2, 7, 8, 9, 10, and 11 of the '995 Patent; and
- claims 1, 7, 8, 10, and 15 of the '971 Patent.

These modules have been and are being manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Canadian Solar. ASGT anticipates that discovery will further confirm the full scope of infringing Canadian Solar products imported into or sold for importation into the United States.

2. Infringement of the Asserted Patents

88. On information and belief, Canadian Solar manufactures, sells for importation into the United States, imports into the United States, and/or sells within the United States after importing the accused Canadian Solar CS3U-350PB-AG and CS3W-410PB-AG modules, of which it is the owner, importer, or consignee.

a. Testing Analysis

89. ASGT directed third parties to test a Canadian Solar CS3U-350PB-AG module. Illustrative results of the test of the CS3U-350PB-AG module are attached as **Exhibit 26**. ASGT directed third parties to test a Canadian Solar CS3W-410PB-AG module. Illustrative results of the test of the CS3W-410PB-AG module is attached as **Exhibit 26**.

b. Infringement of the '599 Patent

90. The Canadian Solar CS3U-350PB-AG and CS3W-410PB-AG modules infringe, literally or under the doctrine of equivalents, at least claims 15, 17, 23, 24, 25, and 27 of the '599 Patent. A claim chart that applies claims 15, 17, 23, 24, 25, and 27 to the exemplary and representative accused Canadian Solar CS3U-350PB-AG module is provided in **Exhibit 27** at pages 2-17. A claim chart that applies claims 15, 17, 23, 24, 25, and 27 to the exemplary and representative accused Canadian Solar CS3W-410PB-AG module is provided in **Exhibit 28** at pages 2-17.

91. On information and belief, the claim charts provided at pages 2-17 of **Exhibits 27** and **28** are representative of many other infringing Canadian Solar products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Canadian Solar, and that include the same or substantially similar features as the exemplary Canadian Solar CS3W-410PB-AG and CS3U-350PB-AG modules.

c. Infringement of the '981 Patent

92. The Canadian Solar CS3U-350PB-AG and CS3W-410PB-AG modules infringe, literally or under the doctrine of equivalents, at least claims 1, 2, 4, 13, 18, 23, 26, and 27 of the '981 Patent. A claim chart that applies claims 1, 2, 4, 13, 18, 23, 26, and 27 to the exemplary and representative accused Canadian Solar CS3U-350PB-AG module is provided in **Exhibit 27** at pages 18-31. A claim chart that applies claims 1, 2, 4, 13, 18, 23, 26, and 27 to the exemplary and representative accused Canadian Solar CS3W-410PB-AG module is provided in **Exhibit 28** at pages 18-31.

93. On information and belief, the claim charts provided at pages 18-31 of **Exhibits 27** and **28** are representative of many other infringing Canadian Solar products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Canadian Solar and that include the same or substantially similar features as the exemplary Canadian Solar CS3W-410PB-AG and CS3U-350PB-AG modules.

d. Infringement of the '640 Patent

94. The Canadian Solar CS3U-350PB-AG and CS3W-410PB-AG modules infringe, literally or under the doctrine of equivalents, at least claims 1, 4, 11, 12, 13, 14, 16, 17, and 18 of the '640 Patent. A claim chart that applies claims 1, 4, 11, 12, 13, 14, 16, 17, and 18 to the

exemplary and representative accused Canadian Solar CS3U-350PB-AG module is provided in **Exhibit 27** at pages 32-54. A claim chart that applies claims 1, 4, 11, 12, 13, 14, 16, 17, and 18 to the exemplary and representative accused Canadian Solar CS3W-410PB-AG is provided in **Exhibit 28** at pages 32-54.

95. On information and belief, the claim charts provided at pages 32-54 of **Exhibits 27** and **28** are representative of many other infringing Canadian Solar products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Canadian Solar and that include the same or substantially similar features as the exemplary Canadian Solar CS3W-410PB-AG and CS3U-350PB-AG modules.

e. Infringement of the '331 Patent

96. The Canadian Solar CS3U-350PB-AG and CS3W-410PB-AG modules infringe, literally or under the doctrine of equivalents, at least claims 1, 2, and 10 of the '331 Patent. A claim chart that applies claims 1, 2, and 10 to the exemplary and representative accused Canadian Solar CS3U-350PB-AG is provided in **Exhibit 27** at pages 65- 77. A claim chart that applies claims 1, 2, and 10 to the exemplary and representative accused Canadian Solar CS3W-410PB-AG module is provided in **Exhibit 28** at pages 65-77.

97. On information and belief, the claim charts provided at pages 65-77 of **Exhibits 27** and **28** are representative of many other infringing Canadian Solar products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Canadian Solar and that include the same or substantially similar features as the exemplary Canadian Solar CS3W-410PB-AG and CS3U-350PB-AG modules.

f. Infringement of the '995 Patent

98. The Canadian Solar CS3U-350PB-AG and CS3W-410PB-AG modules infringe, literally or under the doctrine of equivalents, at least claims 1, 2, and 7-11 of the '331 Patent. A claim chart that applies claims 1, 2, and 7-11 to the exemplary and representative accused Canadian Solar CS3U-350PB-AG module is provided in **Exhibit 27** at pages 78-104. A claim chart that applies claims 1, 2, and 7-11 to the exemplary and representative accused Canadian Solar CS3W-410PB-AG is provided in **Exhibit 28** at pages 78-104.

99. On information and belief, the claim charts provided at pages 78-104 of **Exhibits 27** and **28** are representative of many other infringing Canadian Solar products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Canadian Solar and that include the same or substantially similar features as the exemplary Canadian Solar CS3W-410PB-AG and CS3U-350PB-AG modules.

g. Infringement of the '971 Patent

100. The Canadian Solar CS3U-350PB-AG and CS3W-410PB-AG modules infringe, literally or under the doctrine of equivalents, at least claims 1, 7, 8, 10, and 15 of the '971 Patent. A claim chart that applies claims 1, 7, 8, 10, and 15 to the exemplary and representative accused Canadian Solar CS3U-350PB-AG module is provided in **Exhibit 27** at pages 55-64. A claim chart that applies claims 1, 7, 8, 10, and 15 to the exemplary and representative accused Canadian Solar CS3W-410PB-AG module is provided in **Exhibit 28**, at pages 55-64.

101. On information and belief, the claim charts provided at pages 55-64 of **Exhibits 27** and **28** are representative of many other infringing Canadian Solar products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Canadian Solar and that

include the same or substantially similar features as the exemplary Canadian Solar CS3W-410PB-AG and CS3U-350PB-AG modules.

3. Specific instance of importation, sale for importation, or sale after importation

102. In its 2020 filing with the U.S. Securities and Exchange Commission Form 20-F for the period ending December 31, 2020, Canadian Solar reported that it manufactures its silicon photovoltaic cells and modules in various locations, including the following locations:

- Luoyang factory in Luoyang, Henan Province, China;
- Changshu factory in Suzhou, Jiangsu Province China;
- Vietnamese factory located in Hai Phong City, Vietnam; and
- Thailand factory located in Chon Buri, Thailand.

Exhibit 29 at 52-53. Canadian Solar’s 2020 SEC Form 20-F identifies no silicon photovoltaic manufacturing facility in the United States. *Id.*

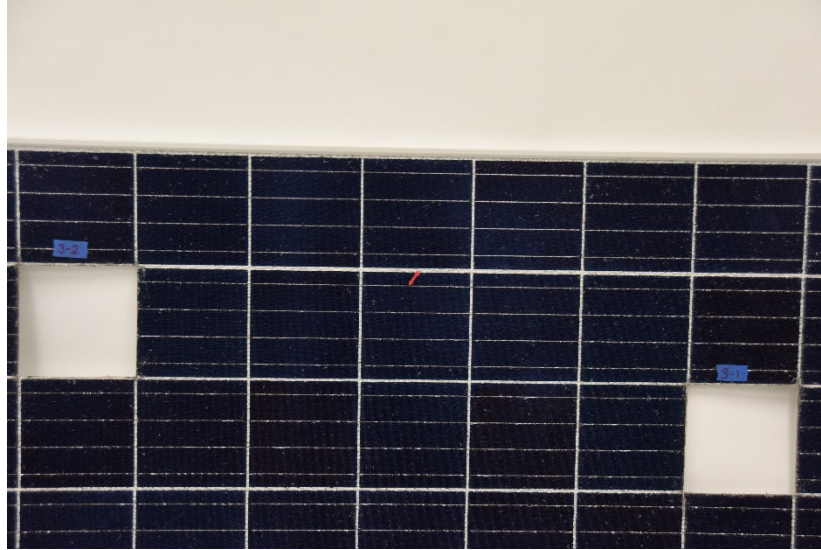
103. On information and belief, Canadian Solar manufactured its representative CS3U-350-PB-AG module outside of the United States and imported it for sale to customers in the United States. Similarly, on information and belief, Canadian Solar manufactured its representative Canadian Solar Model CS3W-410-PB-AG module outside of the United States and imported it for sale to customers in the United States.

104. On December 30, 2020, ASGT purchased, within the United States, 35 imported Canadian Solar Model CS3U-350-PB-AG modules. **Exhibit 30.** The labels affixed to the modules indicate that the modules were “assembled in Thailand with Thai cells.” **Exhibit 31.** Similarly, on December 30, 2020, ASGT purchased, within the United States, 10 Canadian Solar Model CS3W-410-PB-AG modules. **Exhibit 32.** The labels affixed to the modules state that the modules were “made in Thailand. Cell origin: Thailand.” **Exhibit 33.**

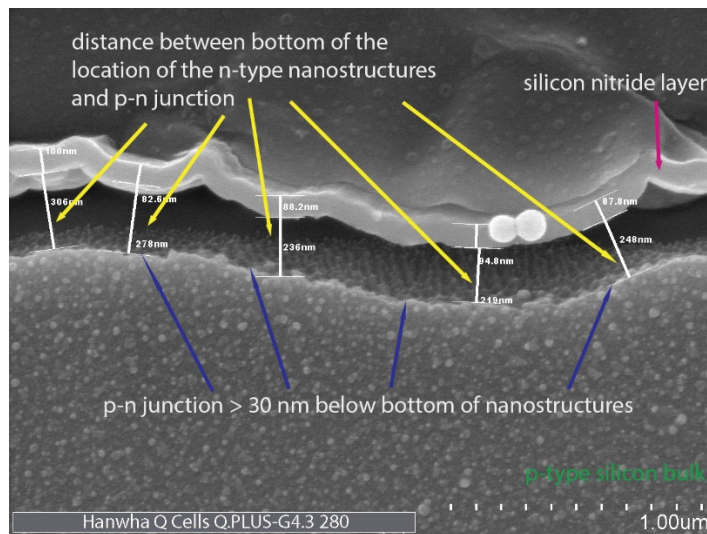
B. Hanwha

1. Representative involved articles

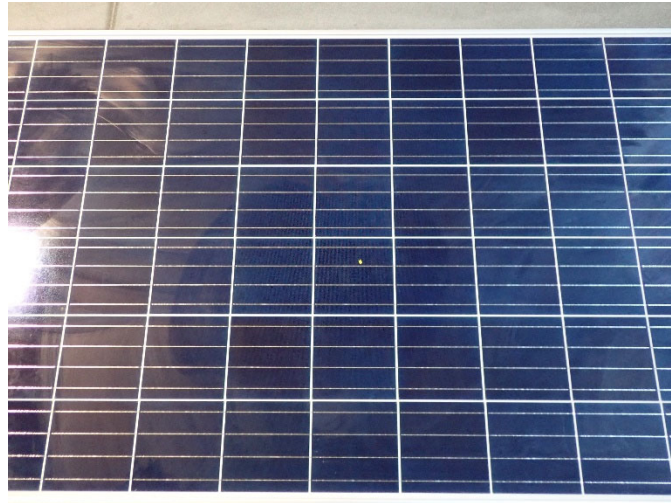
An exemplary Hanwha Accused Product is the Hanwha Q.PLUS-G4.3 280 module that infringes the Asserted Patents and is pictured below in Figure 5 below. **Exhibit 34.**



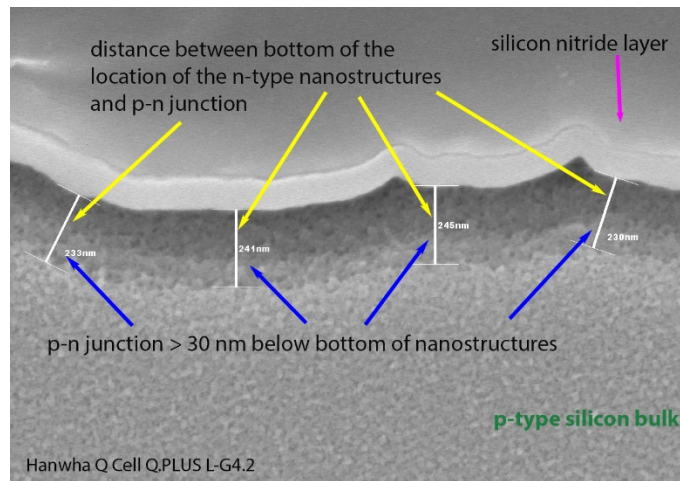
105. A representative cell from the Hanwha Q.PLUS-G4.3 280 module that infringes the Assert Patents includes a plurality of nanostructures on a silicon substrate comprising a p-n junction within the bulk of the substrate and where the p-n junction is at least 30 nm from the bottom of the nanostructures. The representative cell is pictured in Figure 6 below. **Exhibit 35.**



106. An exemplary Hanwha Accused Product is the Hanwha Q.PLUS-L-G4.2 345 module that infringes the Asserted Patents and is pictured below in Figure 7. **Exhibit 36.**



107. A representative cell from the Hanwha Q.PLUS-L-G4.2 345 module that infringes the Asserted Patents includes a plurality of nanostructures on a silicon substrate comprising a p-n junction within the bulk of the substrate and where the p-n junction is at least 30 nm from the bottom of the nanostructures. A representative cell is pictured below in Figure 8. **Exhibit 37.**



108. On information and belief, the exemplary Hanwha Q.PLUS-G4.3 280 module is representative of many other infringing Hanwha photovoltaics manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United

States after importation, by or on behalf of Hanwha, and that include the same or substantially similar features as the exemplary Hanwha Q.PLUS-G4.3 280 modules. Accordingly, on information and belief, ASGT alleges that numerous Hanwha products including the exemplary Hanwha Q.PLUS-G4.3 280 module infringe at least claims 15, 17, 23, 24, 25, and 27 of the '599 Patent and have been and are being manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Hanwha. ASGT anticipates that discovery will further confirm the full scope of infringing Hanwha products imported into or sold for importation into the United States.

109. On information and belief, the exemplary Hanwha Q.PLUS-L-G4.2 345 module is representative of many other infringing Hanwha photovoltaics manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Hanwha, and that include the same or substantially similar features as the exemplary Q.PLUS-L-G4.2 345 module. Accordingly, on information and belief, ASGT alleges that numerous Hanwha products including the exemplary Hanwha Q.PLUS-L-G4.2 345 modules infringe at least claims 15, 17, 23, and 27 of the '599 Patent, and have been and are being manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Hanwha. ASGT anticipates that discovery will further confirm the full scope of infringing Hanwha products imported into or sold for importation into the United States.⁴

110. On information and belief, the exemplary Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules are representative of many other infringing Hanwha photovoltaics

⁴ At this time, ASGT is not accusing the Hanwha Q.PLUS-L-G4.2 345 of infringing claims 24 and 25 of the '599 Patent. ASGT reserves the right to accuse the Hanwha Q.PLUS-L-G4.2 345 of infringing claims 24 and 25 should discovery show such infringement.

manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Hanwha, and that include the same or substantially similar features as the exemplary Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules. Accordingly, on information and belief, ASGT alleges that numerous Hanwha products including the exemplary Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules infringe at least:

- claims 1, 2, 4, 13, 18, 23, 26, and 27 of the '981 Patent;
- claims 1, 4, 11, 12, 13, 14, 16, 17, and 18 of the '640 Patent;
- claims 1, 2, and 10 of the '331 Patent;
- claims 1, 2, 7, 8, 9, 10, and 11 of the '995 Patent; and
- claims 1, 7, 8, 10, and 15 of the '971 Patent.

These modules have been and are being manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Hanwha. ASGT anticipates that discovery will further confirm the full scope of infringing Hanwha products imported into or sold for importation into the United States.

2. Infringement of the Asserted Patents

111. On information and belief, Hanwha manufactures, sells for importation into the United States, imports into the United States, and/or sells within the United States after importing the accused Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules, of which it is the owner, importer, or consignee.

a. Testing Analysis

112. ASGT directed third parties to test a Hanwha Q.PLUS-G4.3 280 module and a Q.PLUS-L-G4.2 345 module. Illustrative results of the tests are attached at **Exhibit 26**.

b. Infringement of the '599 Patent

113. The Hanwha Q.PLUS-G4.3 280 module infringes, literally or under the doctrine of equivalents, at least claims 15, 17, 23, 24, 25, and 27 of the '599 Patent. A claim chart that applies claims 15, 17, 23, 24, 25, and 27 to the exemplary and representative accused Hanwha Q.PLUS-G4.3 280 module is provided in **Exhibit 38**, at pages 2-17.

114. The Hanwha Q.PLUS-L-G4.2 345 module infringes, literally or under the doctrine of equivalents, at least claims 15, 17, 23, and 27 of the '599 Patent. A claim chart that applies claims 15, 17, 23, and 27 to the exemplary and representative accused Hanwha Q.PLUS-L-G4.2 345 module is provided in **Exhibit 39**, at pages 2-13.

115. On information and belief, the claim charts attached as **Exhibits 38** and **39** are representative of many other infringing Hanwha photovoltaics that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Hanwha and that include the same or substantially similar features as the exemplary Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules.

c. Infringement of the '981 Patent

116. The Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules infringe, literally or under the doctrine of equivalents, at least claims 1, 2, 4, 13, 18, 23, 26, and 27 of the '981 Patent. A claim chart that applies claims 1, 2, 4, 13, 18, 23, 26, and 27 to the exemplary and representative accused Hanwha Q.PLUS-G4.3 280 module is provided in **Exhibit 38** at pages 18-32. A claim chart that applies claims 1, 2, 4, 13, 18, 23, 26, and 27 to the exemplary and representative accused Hanwha Q.PLUS-L-G4.2 345 module is provided in **Exhibit 39** at pages 14-27.

117. On information and belief, the claim charts provided at pages 18-32 in **Exhibit 38** and at pages 14-27 of **Exhibit 39** are representative of many other infringing Hanwha products

that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Hanwha, and that include the same or substantially similar features as the exemplary Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules.

d. Infringement of the '640 Patent

118. The Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules infringe, literally or under the doctrine of equivalents, at least claims 1, 4, 11, 12, 13, 14, 16, 17, and 18 of the '640 Patent. A claim chart that applies claims 1, 4, 11, 12, 13, 14, 16, 17, and 18 to the exemplary and representative accused Hanwha Q.PLUS-G4.3 280 is provided in **Exhibits 38**, at pages 33-55. A claim chart that applies claims 1, 4, 11, 12, 13, 14, 16, 17, and 18 to the exemplary and representative accused Hanwha Q.PLUS-L-G4.2 345 is provided in **Exhibits 39**, at pages 28-49.

119. On information and belief, the claim charts provided at pages 33-55 of **Exhibit 38** and at pages 28-49 of **Exhibit 39** are representative of many other infringing Hanwha products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Hanwha, and that include the same or substantially similar features as the exemplary Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules.

e. Infringement of the '331 Patent

120. The Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules infringe, literally or under the doctrine of equivalents, at least claims 1, 2, and 10 of the '331 Patent. A claim chart that applies claims 1, 2, and 10 to the exemplary and representative accused Hanwha Q.PLUS-G4.3 280 module is provided in **Exhibit 38** at pages 67-78. A claim chart that applies

claims 1, 2, and 10 to the exemplary and representative accused Hanwha Q.PLUS-L-G4.2 345 is provided in **Exhibit 39**, at pages 61-71.

121. On information and belief, the claim charts provided at pages 67-78 of **Exhibit 38** and at pages 61-71 of **Exhibit 39** are representative of many other infringing Hanwha products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Hanwha, and that include the same or substantially similar features as the exemplary Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules.

f. Infringement of the '995 Patent

122. The Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules infringe, literally or under the doctrine of equivalents at least claims 1, 2, and 7-11 of the '995 Patent. A claim chart that applies claims 1, 2 and 7-11 of the '995 Patent to the exemplary and representative accused Hanwha Q.PLUS-G4.3 280 module is provided in **Exhibit 38** at pages 79-104. A claim chart that applies claims 1, 2 and 7-11 of the '995 Patent to the exemplary and representative accused Hanwha Q.PLUS-L-G4.2 345 module is provided in **Exhibit 39** at pages 72-95.

123. On information and belief, the claim charts provided at pages 79-104 of **Exhibit 38** and at pages 72-95 of **Exhibit 39** are representative of many other infringing Hanwha products that are sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Hanwha, and that include the same or substantially similar features as the exemplary Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules.

g. Infringement of the '971 Patent

124. The Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules infringe, literally or under the doctrine of equivalents, at least claims 1, 7, 8, 10, and 15 of the '971 Patent. A claim chart that applies claims 1, 7, 8, 10, and 15 to the exemplary and representative accused Hanwha Q.PLUS-G4.3 280 is provided in **Exhibit 38**, at pages 56-66. A claim chart that applies claims 1, 7, 8, 10, and 15 to the exemplary and representative accused Hanwha Q.PLUS-L-G4.2 345 is attached as **Exhibit 39**, pages 50-60.

125. On information and belief, the claim charts provided at pages 56-66 of **Exhibit 38** and at pages 50-60 of **Exhibit 39** are representative of many other infringing Hanwha products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Hanwha, and that include the same or substantially similar features as the exemplary Hanwha Q.PLUS-G4.3 280 and Q.PLUS-L-G4.2 345 modules.

3. Specific instance of importation, sale for importation, or sale after importation

126. In the Auditors' Report accompanying Consolidated Financial Statements for December 31, 2019 and 2018 (the "Auditors' Report"), Hanwha Solutions Corporation reported that its manufacturing locations include the following:

- a silicon ingot factory and solar products factory located in Jiangsu, China;
- a solar products factory located in Selangor, Malaysia;
- a factory located in ChungCheongbuk-do, Korea (Jincheon Plant); and
- an assembly plant located in Dalton, Georgia.

Exhibit 40 at 12-18. The Auditors' Report identified no silicon photovoltaic cell or module production facilities in the United States.

127. Accordingly, on information and belief, the representative Hanwha Q-Cells Q.PLUS-G4.3 280 module and the Hanwha Q-Cells Q.PLUS-L-G4.2 345 module are manufactured outside of the United States and imported for sale to customers in the United States.

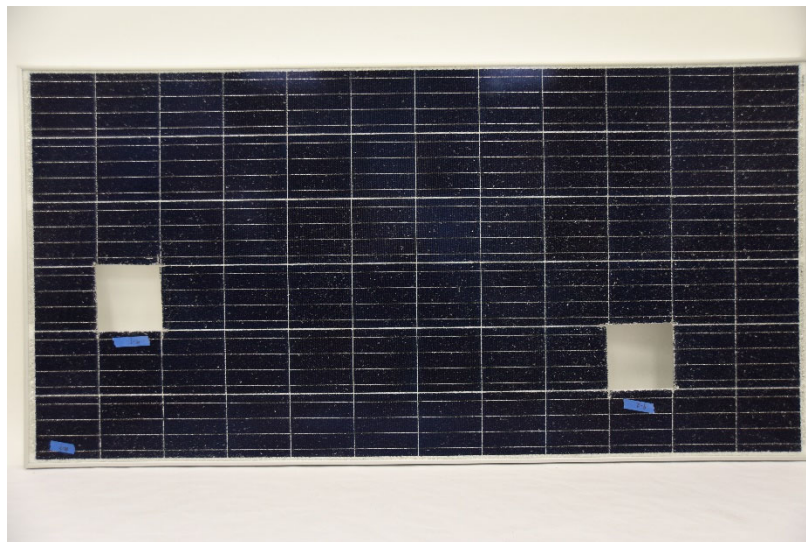
128. On December 10, 2020, ASGT purchased, within the United States, 10 imported Hanwha Q-Cells Q.PLUS-G4.3 280 modules. **Exhibit 41.** The exterior packaging material included with the modules contained a country or origin marking indicating that the modules were “made in Korea.” **Exhibit 42.** Moreover, the product label affixed to the Hanwha Q-Cells Q.PLUS-G4.3 280 module states that it was “Made in Korea.” **Exhibit 43.**

129. On April 10, 2019, a principal in ASGT purchased, within the United States, an imported a Hanwha Q.PLUS-L-G4.2 345 module. **Exhibit 44.** The product label affixed to the Hanwha Q.PLUS-L-G4.2 345 module states that it was “Made in Korea.” **Exhibit 45.** U.S. Customs and Border Protection ship manifest data covering the period 2018-2020 show that Hanwha Q.PLUS-L-G4.2 345 module was routinely imported from Malaysia or South Korea. **Exhibit 46.**

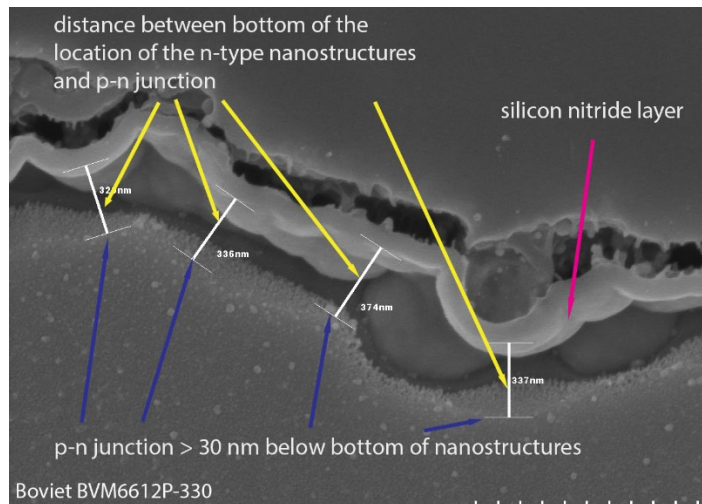
C. **Boviet**

1. **Representative involved articles**

130. An exemplary Boviet Accused Product that infringes the Asserted Patents is the BVM6612P-330 module. It is pictured below in Figure 9. **Exhibit 47.**



131. A representative cell from the Boviet BVM6612P-330 module that infringes the Asserted Patents includes a plurality of nanostructures on a silicon substrate comprising a p-n junction within the bulk of the substrate, where the p-n junction is at least 30 nm from the bottom of the nanostructures. A representative cell is pictured below in Figure 10. **Exhibit 48.**



132. On information and belief, the exemplary Boviet BVM6612P-330 module is representative of many other infringing Boviet photovoltaics manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Boviet, and that include the same or substantially similar features

as the exemplary Boviet BVM6612P-330 module. Accordingly, on information and belief, ASGT alleges that numerous Boviet products including the exemplary Boviet BVM6612P-330 module infringe at least:

- claims 15, 17, 23, 24, 25, and 27 of the '599 Patent;
- claims 1, 2, 4, 13, 18, 23, 26, and 27 of the '981 Patent;
- claims 1, 4, 11, 12, 13, 14, 16, 17, and 18 of the '640 Patent;
- claims 1, 2, and 10 of the '331 Patent;
- claims 1, 2, 7, 8, 9, 10, and 11 of the '995 Patent; and
- claims 1, 7, 8, 10, and 15 of the '971 Patent.

This module has been and is being manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Boviet. ASGT anticipates that discovery will further confirm the full scope of infringing Boviet products imported into or sold for importation into the United States.

2. Infringement of the Asserted Patents

133. On information and belief, Boviet manufactures, sells for importation into the United States, imports into the United States, and/or sells within the United States after importing the accused Boviet BVM6612P-330 module, of which it is the owner, importer, or consignee.

a. Testing Analysis

134. ASGT directed third parties to test a Boviet BVM6612P-330 module. Illustrative results of the test are attached at **Exhibit 26**.

b. Infringement of the '599 Patent

135. The Boviet BVM6612P-330 module infringes, literally or under the doctrine of equivalents, at least claims 15, 17, 23, 24, 25, and 27 of the '599 Patent. A claim chart that

applies claims 15, 17, 23, 24, 25, and 27 to the exemplary and representative accused Boviet BVM6612P-330 module is provided in **Exhibit 49** at pages 2-17.

136. On information and belief, the claim chart provided at pages 2-17 in **Exhibit 49** is representative of many other infringing Boviet products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Boviet, and that include the same or substantially similar features as the exemplary Boviet BVM6612P-330 module.

c. Infringement of the '981 Patent

137. The Boviet BVM6612P-330 module infringes, literally or under the doctrine of equivalents, at least claims 1, 2, 4, 13, 18, 23, 26, and 27 of the '981 Patent. A claim chart that applies claims 1, 2, 4, 13, 18, 23, 26, and 27 to the exemplary and representative accused Boviet BVM6612P-330 module is provided in **Exhibit 49** at pages 18-32.

138. On information and belief, the claim chart provided at pages 18-32 of **Exhibit 49** is representative of many other infringing Boviet products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Boviet, and that include the same or substantially similar features as the exemplary Boviet BVM6612P-330 module.

d. Infringement of the '640 Patent

139. The Boviet BVM6612P-330 module infringes, literally or under the doctrine of equivalents, at least claims 1, 4, 11, 12, 13, 14, 16, 17, and 18 of the '981 Patent. A claim chart that applies claims 1, 4, 11, 12, 13, 14, 16, 17, and 18 to the exemplary and representative accused Boviet BVM6612P-330 module are provided in **Exhibit 49** at pages 33-55.

140. On information and belief, the claim chart provided at pages 33-55 of **Exhibit 49** is representative of many other infringing Boviet products that are manufactured, sold for

importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Boviet, and that include the same or substantially similar features as the exemplary Boviet BVM6612P-330 module.

e. Infringement of the '331 Patent

141. The Boviet BVM6612P-330 module infringes, literally or under the doctrine of equivalents, at least claims 1, 2, and 10 of the '331 Patent. A claim chart that applies claims 1, 2, and 10 to the exemplary and representative accused Boviet BVM6612P-330 module is provided in **Exhibit 49** at pages 66-77.

142. On information and belief, the claim chart provided at pages 66-77 of **Exhibit 49** is representative of many other infringing Boviet products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Boviet, and that include the same or substantially similar features as the exemplary Boviet BVM6612P-330 module.

f. Infringement of the '995 Patent

143. The Boviet BVM6612P-330 module infringes, literally or under the doctrine of equivalents, at least claims 1,2 and 7-11 of the '995 Patent. A claim chart that applies claims 1, 2, and 7-11 of the '995 Patent to the exemplary and representative accused Boviet BVM6612P-330 module is provided in **Exhibit 49** at pages 78-102.

144. On information and belief, the claim chart provided at pages 78-102 of **Exhibit 49** is representative of many other infringing Boviet products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Boviet, and that include the same or substantially similar features as the exemplary Boviet BVM6612P-330 module.

g. Infringement of the '971 Patent

145. The Boviet BVM6612P-330 modules infringe, literally or under the doctrine of equivalents, at least claims 1, 7, 8, 10, and 15 of the '971 Patent. A claim chart that applies claims 1, 7, 8, 10, and 15 to the exemplary and representative accused Boviet BVM6612P-330 module is provided in **Exhibit 49** at pages 56-65.

146. On information and belief, the claim chart provided at pages 56-65 in **Exhibit 49** is representative of many other infringing Boviet products that are manufactured, sold for importation into the United States, imported into the United States, and/or sold within the United States after importation, by or on behalf of Boviet, and that include the same or substantially similar features as the exemplary Boviet BVM6612P-330 module.

3. Specific instance of importation, sale for importation, or sale after importation

147. A January 27, 2021 S&P Capital IQ Report indicates that Boviet manufacturers its modules in Vietnam. **Exhibit 50**. Accordingly, on information and belief, the representative Boviet BVM6612P-330 modules were manufactured outside of the United States and imported for sale to customers in the United States.

148. On January 29, 2021, ASGT purchased, within the United States, eight imported Boviet BVM6612P-330 modules. **Exhibit 51**. The labels on the modules indicate that the modules were "Made in Vietnam. **Exhibit 52**.

VII. CLASSIFICATION OF THE INFRINGING PRODUCTS UNDER THE HARMONIZED TARIFF SCHEDULE

149. The Accused Products fall within the following classifications of the Harmonized Tariff Schedule of the United States:

- HTSUS codes 8541.40.6015 (photovoltaic modules); and

- 8541.40.6025 (photovoltaic cells intended for incorporation into photovoltaic modules).

The Accused Products may also fall within HTSUS codes 8501.31.8010, 8501.32.6010, 8501.6100.10, 8507.20.8010, and 8541.40.6035. These classifications are intended for illustration only and are not intended to be restrictive of the Accused Products.

VIII. LICENSEES

150. ASG Inc. is a licensee to the Asserted Patents. **Exhibit 21** is a copy of the license relating to the Asserted Patents ASGT granted to ASG Inc.

IX. DOMESTIC INDUSTRY

A. The Technical Prong Of The Domestic Industry Requirement Is Satisfied

151. As required by Section 337(a)(2) and defined by Section 337(a)(3), an industry in the United States exists in connection with the Asserted Patents at least because of ASG Inc.'s manufacture and research and development of its photovoltaic biosensor product (the "Domestic Industry Product"). A further description of the Domestic Industry Product is set forth in the confidential declaration of Marcie Black, PhD, the CEO of both ASGT and ASG Inc. (the "Confidential Domestic Industry Declaration"). **Exhibit 53.**

152. The Domestic Industry Product uses the Asserted Patent's claimed technology in a photovoltaic biosensor to detect the presence of target proteins in a biological sample, as well as determining the concentration of the target protein. The Domestic Industry Product features the use of silicon nanostructures, including nanowires, that are functionalized with antibodies selected for their ability to bind to the target proteins of interest. When the silicon nanostructures are exposed to the biological sample, the target proteins in the biological sample bind to the antibodies on the nanostructures. The bound target proteins are then detected optically by shining light on the silicon nanostructures and detecting the resultant photocurrent and/or photovoltage.

153. ASG Inc.’s manufacturing process for its photovoltaic biosensor starts with the fabrication of the nanostructures through a metal-enhanced etch process. In this process, metal (typically silver) is deposited in a continuous layer on the surface of a p-type silicon wafer and then the wafer is etched in a hydrofluoric acid solution with an oxidizer. Once the silicon nanostructures are formed, n-type dopants are diffused into the wafer to form a p-n junction in the bulk of the wafer – more than 30 nm below the nanostructures. In addition, ASG Inc.’s photovoltaic biosensors include, among other things, (1) a silicon oxide passivating layer, (2) screen printed metal contacts, and (3) a metal back contact. A claim chart and explanatory information, demonstrating that ASG Inc.’s Domestic Industry Product practices at least one claim from each of the Asserted Patents, is attached as **Exhibit 54**.

B. The Economic Prong Of The Domestic Industry Requirement Is Satisfied

154. As required by Section 337(a)(3)(A)-(C), a domestic industry exists by virtue of the activities in the United States of ASG Inc., ASGT’s licensee, with respect to the Domestic Industry Product. Specifically, ASG Inc.’s significant investments in plant and equipment with respect to the Domestic Industry Product, its significant employment of labor and capital with respect to the Domestic Industry Product, and its substantial investments in the exploitation of the technology disclosed in the Asserted Patents in the form of research and development and engineering all satisfy the economic prong. In addition, section 337(a)(3)(A)-(C) is satisfied because a domestic industry is in the process of being established.

155. ASG Inc. has made, and is continuing to make, significant and substantial investments in the United States directly tied to the Domestic Industry Product and technology covered by the Asserted Patents. Those investments are directed to developing and eventually commercializing photovoltaic biosensors in the United States with research and development and production at ASG Inc.’s facilities at the University of Massachusetts (“UMass”) in Lowell,

Massachusetts. ASG Inc. is developing and manufacturing photovoltaic biosensors with the expectation of commercial sales by 2023. ASG Inc. has further invested in hiring and training of American workers to continue in the product development process. A complete description of ASG Inc.'s domestic activities is set forth in the Confidential Domestic Industry Declaration.

Exhibit 53.

1. Significant investment in plant and equipment – 337(a)(3)(A)

156. ASG Inc. makes use of four laboratories at two UMass facilities. First, ASG Inc. rents space at the UMass Medical Device Development Center (“M2D2”) incubator facility at 600 Suffolk Street, Lowell, Massachusetts 01854 (the “Lowell Facility”). The square footage of the facility, a description of the equipment used in the facility, and expenses required to maintain the facility are set forth in the Confidential Domestic Industry Declaration. **Exhibit 53.**

157. Second, ASG Inc. has access to additional M2D2 incubator space at 110 Canal Street in Lowell, Massachusetts. M2D2 is a collaborative project between the University of Massachusetts Lowell and the University of Massachusetts Medical School. The M2D2 offers Biotech and Medical Device start-up companies dedicated lab space, equipment and services, open co-working and collaboration space, and meeting and conferencing space.

158. Third, ASG Inc. rents space by the hour at UMass Lowell’s Core Research Facilities (“CRF”) – which consists of an 11,000-square foot center made up of a fully equipped, shared lab facility that can house 50 researchers and includes significant co-working and meeting spaces. The CRF offers over 100 instruments on a pay-per-use basis. The CRF has multiple smaller laboratories. ASG Inc. uses two of these. The Nanofabrication Lab (“NFL”) of CRF also offers Class 100-, Class 1,000- and Class 10,000-level clean-room facilities. ASG Inc. uses the NFL as its “clean room.”

159. Fourth, the CRF has a Materials Characterization Laboratory (“MCL”), which is the University's central instrumentation facility for the characterization of materials. It is available to the entire UMass Lowell research community and industrial collaborators. ASG Inc. uses and will continue to use the MCL and its scanning electron microscope to characterize the sensors associated with its Domestic Industry Product.

160. ASG Inc.’s plant and equipment expenses incurred at these facilities are set forth in the Confidential Domestic Industry Declaration. **Exhibit 53.**

2. Significant employment of labor and capital – 337(a)(3)(B)

161. ASG Inc. historically has made, and continues to make, substantial investments in labor and capital with respect to the Domestic Industry Product. ASG Inc.’s labor and capital expenses incurred with respect to the Domestic Industry Products are set forth in the Confidential Domestic Industry Declaration. **Exhibit 53.**

3. Substantial investments in research and development and engineering – 337(a)(3)(C)

162. ASG Inc. historically has made and continues to make substantial investments in research and development and engineering related to the exploitation of the Asserted Patents. ASG Inc.’s research and development and engineering expenses are set forth in the Confidential Domestic Industry Declaration. **Exhibit 53.**

4. A domestic industry is in the process of being established

163. ASG Inc.’s significant activities summarized above demonstrate that it has made substantial investments in plant, equipment, labor, and capital all related to the Domestic Industry Product, and substantial investments in research and development and engineering related to the Asserted Patents. Alternatively, ASG Inc.’s historical accomplishments and stated future objectives demonstrate that its domestic industry is in the process of being established. In

particular, ASG Inc. is taking the necessary, tangible steps to establish a domestic industry, and there is a significant likelihood that the domestic industry requirement will be satisfied in the future. A more detailed description of ASG Inc.'s historical accomplishments and future planned activities is contained in the Confidential Domestic Industry Declaration at **Exhibit 53**.

X. RELATED LITIGATION

164. Simultaneous with filing this Complaint, ASGT is filing in the U.S. District Court for the Northern District of California a complaint for patent infringement of the Asserted Patents by Canadian Solar and related companies alleging infringement of the Asserted Patents.

165. Simultaneous with filing this Complaint, ASGT is filing in the U.S. District Court for the Central District of California a complaint for patent infringement of the Asserted Patents by Hanwha-Q Cells and related companies alleging infringement of the Asserted Patents.

166. Simultaneous with filing this Complaint, ASGT is filing a complaint in the U.S. District Court for the Northern District of California for patent infringement of the Asserted Patents by Bovie Solar Technology Co., Ltd. and related companies alleging infringement of the Asserted Patents.

167. To Complainant's knowledge, no other court or agency litigations or proceedings involve the Asserted Patents or any of their counterparts.

XI. REQUESTED RELIEF

WHEREFORE, by reason of the foregoing, ASGT respectfully requests that the United States International Trade Commission:

(a) institute an immediate investigation, pursuant to Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, with respect to Respondents' violations of Section 337 based on the unlawful importation into the United States, sale for importation into the United States, and/or sale within the United States after importation of articles that infringe one or more

claims of United States Patent No. 8,450,599, United States Patent No. 8,852,981, United States Patent No. 9,601,640, United States Patent No. 9,768,331, United States Patent No. 10,269,995, and United States Patent No. 10,692,971, as well as the unlawful importation into the United States, sale for importation into the United States, and/or sale within the United States after importation of products containing the same made by or for Respondents;

(b) schedule and conduct a hearing on the unlawful acts and, following the hearing, determine whether there has been a violation of Section 337;

(c) issue a permanent limited exclusion order, pursuant to Section 337(d) of the Tariff Act of 1930, as amended, excluding from entry into the United States all of Respondents' silicon photovoltaic cells and modules and products containing same that infringe one or more claims of United States Patent No. 8,450,599, United States Patent No. 8,852,981, United States Patent No. 9,601,640, United States Patent No. 9,768,331, United States Patent No. 10,269,995, and United States Patent No. 10,692,971;

(d) issue a permanent cease and desist order, pursuant to Section 337 of the Tariff Act of 1930, as amended, prohibiting Respondents and related companies from at least offering for sale, selling for importation, importing, selling after importation, transferring, distributing, warehousing inventory for distribution, using, assembling, advertising, marketing, demonstrating, qualifying for use in the products of others, testing or installing solar cells and products containing same, including silicon photovoltaic, that infringe one or more claims of United States Patent No. 8,450,599, United States Patent No. 8,852,981, United States Patent No. 9,601,640, United States Patent No. 9,768,331, United States Patent No. 10,269,995, and United States Patent No. 10,692,971;

(e) impose a bond during the 60-day Presidential review period pursuant to 19 U.S.C. § 1337(e)(1) and (f)(1) to prevent further injury to ASGT's and ASG Inc.'s domestic industry relating to United States Patent No. 8,450,599, United States Patent No. 8,852,981, United States Patent No. 9,601,640, United States Patent No. 9,768,331, United States Patent No. 10,269,995, and United States Patent No. 10,692,971; and

(f) grant such other and further relief as the Commission deems just and proper based on the facts determined by the investigation and the authority of the Commission.

June 11, 2021

Respectfully submitted,

/s/ Jeffrey M. Telep

Jeffrey M. Telep
(jtelep@kslaw.com)
Richard C. Lutz, Consultant
(rlutz@kslaw.com)
KING & SPALDING LLP
1700 Pennsylvania Avenue, NW, Suite 200
Washington, DC 20006
Telephone: (202) 737-0500

Joseph D. Eng Jr.
(jeng@kslaw.com)
KING & SPALDING LLP
1185 Avenue of the Americas
New York, New York 10036
Telephone: (212) 556-2100

Michael F. Heafey
(mheafey@Heafey-Law.com)
THE LAW OFFICES OF MICHAEL F.
HEAFEY
1325 Howard Street, No. 160
Burlingame, California 94010
Telephone: (650) 346-4161

Robert Kent
(kent@turnerboyd.com)
Zhuanjia Gu
(gu@turnerboyd.com)
TURNER BOYD LLP
702 Marshall Street, Suite 640
Redwood City, California 94063
Telephone: (650) 521-5930

*Counsel for Complainant, Advanced Silicon
Group Technologies LLC*

VERIFICATION

I, Marcie Black, hereby declare and state, in accordance with 19 C.F.R. §§ 210.4 and 210.12(a) and under penalty of perjury, that the following statements are true:

1. I am the Chief Executive Officer of Advanced Silicon Group Technologies LLC, and I am duly authorized to verify this Complaint of Advanced Silicon Group Technologies LLC under Section 337 of the Tariff Act of 1930, as Amended (“the Complaint”);

2. I have read the Complaint, and I am aware of its contents;

3. To the best of my knowledge, information, and belief, formed after an inquiry reasonable under the circumstances, (a) the claims and other legal contentions in the Complaint are warranted by existing law or by a non-frivolous argument for the extension, modification, or reversal of existing law or the establishment of new law, and (b) the allegations and other factual contentions in the Complaint have evidentiary support or, if specifically so identified, are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery; and

4. The Complaint is not being presented for any improper purpose, such as to harass or to cause unnecessary delay or needless increase in the cost of the investigation or related proceeding.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct, and that the statement made on information and belief are believed by me to be true.

Executed on the 11th day of June 2021.

/s/ Marcie Black

Marcie Black

Chief Executive Officer Advanced Silicon Group Technologies LLC

Chief Executive Officer, Advanced Silicon Group, Inc.