UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CANADIAN SOLAR INC.,
Petitioner,

v.

MAXEON SOLAR PTE. LTD.
Patent Owner

Patent No. 8,878,053
Issued: November 4, 2014
Filed: June 13, 2012
Inventor: Peter John Cousins
Title: Front Contact Solar Cell with Formed Emitter
Inter Partes Review No. IPR2024-01040

CORRECTED DECLARATION OF SYLVIA HALL-ELLIS REGARDING U.S. PATENT NO. 8,878,053

I, Sylvia D. Hall-Ellis, do hereby declare and state, that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, under Section 1001 of Title 18 of the United States Code.

Executed on: February 6, 2025

Sylvia D. Hall-Ellis, Ph.D.

INTRODUCTION

1. My name is Sylvia D. Hall-Ellis. I have been retained as an expert by Counsel for Canadian Solar, Incorporated (referred to herein as "Canadian").

2. I have written this report at the request of Canadian to provide my expert opinion regarding the authenticity and public availability of several publications. My report sets forth my opinions in detail and provides the basis for my opinions regarding the public availability of these publications.

3. I reserve the right to supplement or amend my opinions, and basis for them, in response any additional evidence, testimony, discovery, argument, and/or other additional information that may be provided to me after the date of this report.

4. I am being compensated for my time spent working on this matter at my normal consulting rate of $400 per hour, plus reimbursement for any additional reasonable expenses. My compensation is not in any way tied to the content of this report, the substance of my opinions, or the outcome of this proceeding. I have no other interests in this proceeding or with any of the parties.

5. All of the materials that I considered are discussed explicitly in this report.

I. SUMMARY OF OPINIONS

6. It is my opinion that the publications described below were publicly available on the corresponding date listed in the table below, and in any event earlier than February 20, 2007:

Exhibit	Publication	Date
1008	Kwark, Young H., Ron Sinton, and Richard M. Swanson. "SIPOS Heterojunction Contacts to Silicon." *Proceedings of the 1984 International Electron Devices Meeting Technical Digest* (pp. 742-745). New York: Institute of Electrical and Electronics Engineers, 1984.	February 1, 1986, but no later than August 26, 1997 or August 9, 2005.
1013	Sivoththaman, S., W. Laureys, P. De Schepper, J. Nijs, and R. Mertens. "Rapid Thermal Processing of Conventionally and Electromagnetically Cast 100 cm2 Multicrystalline Silicon." *Conference Record of the 25th IEEE Photovoltaic Specialists Conference -1996* (pp. 621-624). New York; Piscataway, NJ: Institute of Electrical and Electronics Engineers ; IEEE Service Center, 1996.	September 1997, but no later than August 6, 2002
1019	*Handbook of Photovoltaic Science and Engineering*, edited by Antonio Luque and Steven Hegedus. Hoboken, NJ: Wiley, c2003.	August 7, 2003
1007	Gan, Jon-Yiew, and R. M. Swanson. "Polysilicon Emitters for Silicon Concentrator Solar Cells." *Conference Record of the 21st IEEE Conference on Photovoltaic Specialists*, 2 vols. (vol 1, pp. 245-250). New York, Institute of Electrical and Electronics Engineers, 1990.	1994, but no later than August 6, 2002
1012	Hartiti, B., S. Sivoththaman, R. Schindler, J. Nijs, J. C. Muller, and P. Siffert. "Low Temperature Formation of Emitter and EEF by Rapid Thermal Co-Diffusion of P, AI or B." *1994 IEEE 1st World Conference on Photovoltaic Energy Conversion* - WCPEC 1994. 2 vols. (vol. 2, pp. 1519-1522). Piscataway, NJ: IEEE, 1994.	June 29, 1995, but no later than August 6, 2002

II. QUALIFICATIONS

7. I am currently an Adjunct Professor in the School of Information at San José State University. I obtained a Master of Library Science from the University of North Texas in 1972 and a Ph.D. in Library and Information Science from the University of Pittsburgh in 1985. Over the last fifty years, I have held various positions in the field of library and information resources. I was first employed as a librarian in 1966 and have been involved in the field of library sciences since, holding numerous positions.

8. I am a member of the American Library Association ("ALA") and its Association for Library Collections & Technical Services ("ALCTS") Division, and I served on the Committee on Cataloging: Resource and Description (which wrote the new cataloging rules) and as the chair of the Committee for Education and Training of Catalogers and the Competencies and Education for a Career in Cataloging Interest Group. I also served as the Chair of the ALCTS Division's Task Force on Competencies and Education for a Career in Cataloging. Additionally, I served as the Chair for the ALA Office of Diversity's Committee on Diversity, as a member of the REFORMA National Board of Directors, and as a member of the Editorial Board for the ALCTS premier cataloging journal, *Library Resources and Technical Services,* as a Co-Chair of the Membership Committee for the Library Research Round Table (LRRT) of the American Library

Association, and as a member of the LRRT Nominating Committee. Currently I serve as a member of the CORE Margaret Mann Citation Committee.

9. I have also given over one-hundred presentations in the field, including several on library cataloging systems and Machine-Readable Cataloging ("MARC") standards. My current research interests include library cataloging systems, metadata, and organization of electronic resources.

10. I have been deposed thirty-five times: (1) *Symantec Corp. vs. Finjan, Inc.,* Petition for *Inter Partes Review* of U.S. Patent No. 7,613,926, May 26, 2016, on behalf of Symantec Corp.; (2) *Symantec Corp. vs. Finjan, Inc.,* Northern District of California, 14-cv-299-HSG, on behalf of Symantec Corp., September 14, 2017; (3) one deposition for ten matters: *Intellectual Ventures I LLC vs. AT&T Mobility LLC*; AT&T Mobility II LLC, New Cingular Wireless Services, Inc., SBC Internet Services, Inc., Wayport, Inc., and Cricket Wireless LLC, C.A. No. 12-193 (LPS); *Intellectual Ventures II LLC vs. AT&T Mobility LLC*; AT&T Mobility II LLC, New Cingular Wireless Services, Inc., SBC Internet Services, Inc., Wayport, Inc., and Cricket Wireless LLC, C.A. No. 13-1631 (LPS); *Intellectual Ventures I LLC vs. T-Mobile USA, Inc. and T-Mobile US, Inc.,* C.A. No. 13-1632 (LPS); *Intellectual Ventures II LLC vs. T-Mobile USA, Inc. and T-Mobile US, Inc.,* C.A. No. 13-1633 (LPS); *Intellectual Ventures I LLC, vs. Nextel Operations, Inc., Sprint Spectrum L.P., Boost Mobile, LLC and Virgin Mobile USA, L.P.,* C.A. No. 13-1634

(LPS); *Intellectual Ventures II LLC vs. Nextel Operations, Inc., Sprint Spectrum L.P., Boost Mobile, LLC and Virgin Mobile USA, L.P.,* C.A. No. 13-1635 (LPS); *Intellectual Ventures I LLC, vs. United States Cellular Corporation*, C.A. No. 13-1636 (LPS); *Intellectual Ventures I LLC vs. United States Cellular Corporation*, C.A. No. 13-1637 (LPS); *Intellectual Ventures II LLC vs. AT&T Mobility LLC*, *AT&T Mobility II LLC, New Cingular Wireless Services, Inc.,* C.A. No. 15-799 (LPS); *Intellectual Ventures I LLC vs. T-Mobile USA, Inc. and T-Mobile US, Inc.,* C.A. No. 15-800 (LPS), on behalf of AT&T Mobility LLC; AT&T Mobility II LLC, Boost Mobile, LLC Cricket Wireless LLC, Nextel Operations, Inc., New Cingular Wireless Services, Inc., SBC Internet Services, Inc., Sprint Spectrum L.P., T-Mobile USA, Inc., T-Mobile US, Inc., United States Cellular Corporation Virgin Mobile USA, L.P., and Wayport, Inc., November 15, 2016; (4) *Hitachi Maxell, LTD., v. Top Victory Electronics (Taiwan) Co. Ltd., et al.,* Eastern District of Texas, 2:14-cv-1121 JRG-RSP (E.D. Texas), on behalf of Top Victory Electronics (Taiwan) Co. LTD, *et. al.,* January 20, 2016; (5) *Sprint Spectrum, L.P. vs. General Access Solutions, Ltd*., Petition for *Inter Partes Review* of U.S. Patent No. 7,173,916, on behalf of Sprint Spectrum L.P., July 13, 2018; (6) *Nichia Corporation vs. Vizio, Inc*., Central District of California, 8:16-cv-00545; on behalf of Vizio, Inc., October 12, 2018; (7) *Intellectual Ventures I LLC, vs. T-Mobile USA, Inc., T-Mobile US, Inc., Ericsson Inc., and Telefonaktiebolaget LM Ericsson*,

Middle District of Florida, 2:17-cv-00557 (JRG), on behalf of T-Mobile USA, Inc., T-Mobile US, Inc., Ericsson Inc., and Telefonaktiebolaget LM Ericsson, October 19, 2018; (8) Pfizer, Inc. vs. Biogen, Inc., Petition for *Inter Partes Review* of U.S. Patent No. 8,821,873, on behalf of Pfizer, November 3, 2018; (9) *Finjan, Inc. vs. ESET, LLC and ESET SPOL. S.R.O.,* Southern District of California, 3:17-cv-00183-CAB-BGS, on behalf of ESET, January 15, 2019; (10) *Finjan, Inc. vs. Cisco Systems, Inc.,* Northern District of California, 5:17-cv-00072-BLF-SVK, on behalf of Cisco Systems, Inc., September 6, 2019; (11) *Facebook, Inc., Instagram, LLC and Whatsapp Inc. vs. Blackberry Limited*, Petition for *Inter Partes Review* of U.S. Patent No. 9,349,120 B2, on behalf of Facebook, Inc., Instagram, LLC and Whatsapp Inc. December 20, 2019; (12) *3Shape A/S and Shape Inc. v. Align Technology, Inc.,* Petition for *Inter Partes Review* of U.S. Patent No. 7,156,661, IPR2020-00222 and IPR2020-00223, August 10, 2020, on behalf of 3Shape A/S and 3Shape Inc.; (13) *Finjan Inc. v. Rapid7, Inc. and Rapid7 LLC*, District of Delaware, 1:18-cv-01519-MN, September 15, 2020; (14) *VLSI Technology LLC v. Intel Corporation*, Western District of Texas, 6:19-cv-00254, 6:19-cv-00255, 6:19-cv-00256, on behalf of Intel Corporation, September 23, 2020; (15) *Finjan Inc. v. Sonicwall, Inc.,* Northern District of California, 5:17-cv-04467-BLF-HRL, on behalf of Sonicwall, Inc., October 27, 2020; (16) *VLSI Technology, LLC v. Intel Corporation*, District of Delaware, 1:18-cv-00966-CFC-CJB, February 5, 2021, on

behalf of the Intel Corporation; (17) *Unified Patents, LLC v. Good Kaisha IP Bridge 1*, Petition for *Inter Partes Review* of U. S. Patent 7,817,868, February 11, 2021, on behalf of Unified Patents; (18) *Finjan, Inc. v. Qualsys, Inc.,* Northern District of California, 4:18-cv-07229-YGR, March 1, 2021, on behalf of Qualsys, Inc.; (19) *Qualcomm, Inc. v. Monterey Research LLC*, Petition for *Inter Partes Review* of U. S. Patent 6,534,805, May 6, 2021, on behalf of Qualcomm, Inc.; (20) *Hulu, LLC v. Sound View Innovations, LLC*, Petition for *Inter Partes Review* of U. S. Patent 5,806,062, May 14, 2021, on behalf of Hulu, LLC; (21) *VLSI Technology LLC v. Intel Corporation*, Western District of Texas, 6:19-cv-00254, 6:19-cv-00255 and 6:19-cv-00256, August 3, 2021, on behalf of Intel Corporation; (22) *Liquidia Technologies, Inc. v. United Therapeutics Corporation*, Petition for *Inter Partes Review* of U. S. Patent 10,716,793 B2, October 20, 2021, on behalf of Liquidia Technologies, Inc.; (23) *EcoFactor, Inc. v. Google, Inc.,* Western District of Texas, 6:20-cv-00075 (ADA), 6:20-0078-ADA, and 6:20-cv-00080 ADA, October 27, 2021, on behalf of Google, Inc.; (24) *Liquidia Technologies, Inc. v. United Therapeutics Corporation*, Petition for *Inter Partes Review* of U. S. Patent 10,716,793 B2, March 11, 2022, on behalf of Liquidia Technologies, Inc.; (25) *Juniper Networks, Inc. v. Swarm Technology LLC*, Petition for *Inter Partes Review* of U. S. Patent 9,852,004, May 5, 2022, on behalf of Juniper Networks, Inc.; (26) *ParkerVision, Inc. v. Intel Corporation*, Western District of Texas, 6:20-cv-108

(ADA), October 26, 2022, on behalf of the Intel Corporation; (27) *CommScope v. TQ Delta*, Petition for *Inter Partes Review* of U. S. Patents 9,094,348 and 10,833,809, February 16, 2023, on behalf of CommScope; (28) *WSOU Investments d/b/a Brazos v. Salesforce.com, Inc.* for Western District of Texas, 6:20-cv-01164-ADA and 6:20-cv-01170-ADA, April 18, 2023, on behalf of Salesforce; (29) *Regents of the University of Minnesota v. AT&T Mobility LLC*, District of Minnesota, 14:cv-4999-JRT-TNL & 14-cv-4669-JRT-TNL, May 18, 2023, on behalf of AT & T Mobility LLC; (30) *VLSI Technology LLC v. Intel Corporation*, Northern District of California, 5:17-cv-0571-BLF-NC, July 11, 2023, on behalf of Intel Corporation; (31) *Trustees of Purdue University v. ST Microelectronics*, Western District of Texas, 6:21-cv-00727-ADA, July 27, 2023, on behalf of ST Microelectronics; (32) *Advanced Micro Devices, Inc. v. Realtek Semiconductor Corp.,* Petition for *Inter Partes Review* of U. S. Patents 7,936,245 & 9,590,582, August 10, 2023, on behalf of Advanced Micro Devices, Inc.; (33) Motif Foodworks, Inc. v. Impossible Foods, Inc., Petition for *Inter Partes Review* of U. S. Patent 9,943,096, August 24, 2023, on behalf of Motif Foodworks, Inc.; (34) *Network System Technologies, LLC v. Texas Instruments, Inc.*, Eastern District of Texas, 2:22-cv-00482-RWS, March 20, 2024, on behalf of Texas Instruments, Inc.; and, (35) *Pardalis Technology Licensing, LLC v. International Business Machines, Corporation*, Eastern District of Texas, 2:22-cv-00452, May 23, 2024, on behalf of

International Business Machines, Corporation. I have testified at trial three times: (1) *Advanced Micro Devices, Inc. v. Realtek Semiconductor Corp.,* U. S. Patents 7,936,245 & 9,590,582, October 20, 2023, International Trade Commission, Washington, DC, on behalf of Advanced Micro Devices, Inc.; (2) *Trustees of Purdue University v. ST Microelectronics*, Western District of Texas, 6:21-cv-00727-ADA, November 29, 2023, on behalf of ST Microelectronics; and, (3) *Certain Power Converter Modules and Computing Systems Containing the Same*, Investigation ITC-337-TA-1370, International Trade Commission, May 1, 2024, on behalf of Delta Electronics, Inc.

11. My full *curriculum vitae* is submitted herewith as Exhibit 1033.

III. PRELIMINARIES

12. *Scope of this report.* I am not an attorney and will not offer opinions on the law. I am, however, rendering my expert opinion on the authenticity of the documents referenced herein and on when and how each of these documents was disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, could have located the documents before February 20, 2007.

13. I am informed by counsel that an item is considered authentic if there is sufficient evidence to support a finding that the item is what it is claimed to be. I am also informed that authenticity can be established based on the contents of the

documents themselves, such as the appearance, contents, substance, internal patterns, or other distinctive characteristics of the item, taken together with all of the circumstances. I am further informed that an item is considered authentic if it is at least 20 years old, in a condition that creates no suspicion of its authenticity, and in a place where, if authentic, it would likely be. Lastly, I have been informed that a document's authenticity can be established by comparison with an authentic specimen.

14. I am informed by counsel that a printed publication qualifies as publicly accessible as of the date it was disseminated or otherwise made available such that a person interested in and ordinarily skilled in the relevant subject matter could locate it through the exercise of ordinary diligence.

15. While I understand that the determination of public accessibility under the foregoing standard rests on a case-by-case analysis of the facts particular to an individual publication, I also understand that a printed publication is rendered "publicly accessible" if it is cataloged and indexed by a library such that a person interested in the relevant subject matter could locate it (*i.e.*, I understand that cataloging and indexing by a library is sufficient, though there are other ways that a printed publication may qualify as publicly accessible). One manner of sufficient indexing is indexing according to subject matter category. I understand that the cataloging and indexing by a single library of a single instance of a particular

printed publication is sufficient, even if the single library is in a foreign country. I understand that, even if access to a library is restricted, a printed publication that has been cataloged and indexed therein is publicly accessible so long as a presumption is raised that the portion of the public concerned with the relevant subject matter would know of the printed publication. I also understand that the cataloging and indexing of information that would guide a person interested in the relevant subject matter to the printed publication, such as the cataloging and indexing of an abstract for the printed publication, is sufficient to render the printed publication publicly accessible.

16. I understand that routine business practices, such as general library cataloging and indexing practices, can be used to establish an approximate date on which a printed publication became publicly accessible.

A. Persons of Ordinary Skill in the Art

17. I am told by counsel that the subject matter of this proceeding relates generally to solar cell design and manufacturing.

18. I have been informed by counsel that a "person of ordinary skill in the art at the time of the inventions" is a hypothetical person who is presumed to be familiar with the relevant field and its literature at the time of the inventions. This hypothetical person is also a person of ordinary creativity, capable of understanding the scientific principles applicable to the pertinent field.

19. I am told by counsel that persons of ordinary skill in this subject matter or art would have been someone with an advanced degree in electrical engineering, applied physics, chemistry, or materials science, and at least two years of experience designing, developing, or researching in the field. Alternatively, that person would have had a bachelor's degree in electrical engineering, applied physics, or materials science, and at least three years of experience designing, developing, or researching in the field.

20. It is my opinion that such a person would have been engaged in research, learning through study, and practice in the field and possibly through formal instruction the bibliographic resources relevant to his or her research. By not later than the late 1990s (and more specifically, 1998), such a person would have had access to a vast array of long-established print resources in the field, as well as to a rich set of online resources providing indexing information, abstracts, and full text services for publications relevant to the field of this dispute.

B. Authoritative Databases

21. In preparing this report, I used authoritative databases, such as the OCLC WorldCat, the Library of Congress Online Catalog, and the U. S. Copyright Office database, to confirm citation details of the various publications discussed.

22. *OCLC WorldCat Database.* The OCLC was created "to establish, maintain and operate a computerized library network and to promote the evolution

of library use, of libraries themselves, and of librarianship, and to provide processes and products for the benefit of library users and libraries, including such objectives as increasing availability of library resources to individual library patrons and reducing the rate of rise of library per-unit costs, all for the fundamental public purpose of furthering ease of access to and use of the ever-expanding body of worldwide scientific, literary and educational knowledge and information."[1] Among other services, OCLC and its members are responsible for maintaining the WorldCat database,[2] used by independent and institutional libraries throughout the world.

23. *U. S. Copyright Office.* Created by Congress in 1897, the Copyright Office is responsible for administering a complex and dynamic set of laws, which include registration, the recordation of title and licenses, a number of statutory licensing provisions, and other aspects of the *1976 Copyright Act* and the *1998 Digital Millennium Copyright Act*. The public catalog in the Copyright Office includes information filed since 1978.[3] Individuals can search by title, personal or corporate name, key word, registration number, and document number. Works

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[1] Third Article, Amended Articles of Incorporation of OCLC Online Computer Library Center, Incorporated (available at https://www.oclc.org/content/dam/oclc/membership/articles-of-incorporation.pdf)

[2] http://www.worldcat.org/

[3] https://cocatalog.loc.gov/cgi-bin/Pwebrecon.cgi?DB=local&PAGE=First

filed before 1978 can be located through the Copyright Public Records Reading Room.[4] A researcher can find the date on which an item was published and deposited for copyright.

24. *ResearchGate*.[5] A social networking site designed for scientists and researchers to share papers, ask and answer questions, and find collaborators, *ResearchGate* is the largest academic social network in terms of active users. As of September 2023, ResearchGate had more than 25 million users, with its largest user-bases coming from Europe and North America.[6]

25. Features available to *ResearchGate* members include following a research interest and the work of other individual participants, a blogging feature for users to write short reviews on peer-reviewed articles, private chat rooms for sharing data, editing documents, or discussing confidential topics, and a research-focused job board. *ResearchGate* indexes self-published information on user profiles and suggests members connect with others who have similar interests. Member questions are fielded to others who have identified relevant expertise on their profiles.

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[4] https://www.copyright.gov/circs/circ23.pdf

[5] www.researchgate.net

[6] https://en.wikipedia.org/wiki/ResearchGate

26. *ResearchGate* restricts its user accounts to people at recognized institutions and published researchers. Most of *ResearchGate's* users are involved in medicine, biology, engineering, computer science, agricultural sciences, and psychology. *ResearchGate* publishes a citation impact measurement in the form of an "RG Score," which is reported to be correlated with existing citation impact measures. *ResearchGate* does not charge fees for putting content on the site and does not require peer review.

27. *Semantic Scholar.*[7] A project developed at the Allen Institute for Artificial Intelligence and publicly released in November 2015, *Semantic Scholar* is designed to be an AI-backed search engine for scientific journal articles which uses a combination of machine learning, natural language processing, and machine vision to add a layer of semantic analysis to the traditional methods of citation analysis, and to extract relevant figures, entities, and venues from papers. *Semantic Scholar* is designed to highlight important, influential papers, and to identify the connections between them.

28. As of January 2018, following a 2017 project that added biomedical papers and topic summaries, the *Semantic Scholar* corpus included more than 40 million papers from computer science and biomedicine. In March 2018, Doug Raymond, who developed machine learning initiatives for the Amazon

[7] https://www.semanticscholar.org

Alexa platform, was hired to lead the *Semantic Scholar* project. As of August 2019, the number of included papers had grown to more than 173 million after the addition of the Microsoft Academic Graph records, already used by Lens.org.

29. *IEEE Xplore.*[8] Librarians in academic, special, and large public libraries are familiar with the *IEEE Xplore* digital database. In working with undergraduate and graduate students, researchers, scientists, and the public, librarians are intimately familiar with the *IEEE Xplore* digital database and rely on its content for access to reliable, accurate publications. Established to serve as a digital database for the IEEE's ebooks, standards, conference papers, technical reports, and journal articles, and related documents dating from 1988 to the present and selectively from 1913 to 1987, *IEEE Xplore* is a scholarly research database that includes 6.3 million documents which is known for its reputable curation and maintenance of documents and publication information. *IEEE Xplore* is and has been text searchable, such as by author, publication, title, year, and content or subject matter. The *IEEE Xplore* digital database accurately reports dates of publications and events and accurately reports locations of events in accordance with standard practices for major industry journals. Approximately 20,000 new documents are added to *IEEE Xplore* each month. Abstracts are free

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[8] https://ieeexplore.ieee.org/Xplore/home.jsp

to access, but access to full text requires a subscription or institutional login. *IEEE Xplore* was launched in May 2000 to store IEEE publications.[9] Older publications were added to the database gradually, and hence, the date *IEEE Xplore* added a document may be later than the earliest publication date of a document (*e.g.*, a publication from 1990 could have been added to *IEEE Xplore* after 2000). Thus, while *IEEE Xplore* reliably reports the date a document was added to *IEEE Xplore* for download by the public, that date does not necessarily correspond to the first time the document was publicly available. However, the date a pre-2000 publication was added to *IEEE Xplore* demonstrates that the pre-2000 publication was publicly available and disseminated no later than the date it was added to *IEEE Xplore*.

30. The *IEEE Xplore* requires peer review before publishing content. I have used IEEE publications in print and online for nearly 50 years. Currently I have access to IEEE documents as part of the resources for faculty through the King Library at San José State University. In addition to covering material from the IEEE, the IEEE *Xplore* also covers materials from the Institution of Engineering and Technology. The *IEEE Xplore* digital library provides Web access to more than 5.3-million full-text documents from some of the world's most

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[9] https://innovate.ieee.org/ieee-xplore-reaches-5-million-documents/#:~:text=In%20May%202000%2C%20the%20IEEE,and%20views%20in%20that%20time

highly cited publications. Approximately 20,000 new documents are added to *IEEE Xplore* each month. Abstracts are free to access, but access to full text requires a subscription or institutional login.

C. Indexing

31. A researcher may discover material relevant to his or her topic in a variety of ways. One common means of discovery is to search for relevant information in an index of periodical and other publications. Having found relevant material, the researcher will then normally obtain it online, look for it in libraries, or purchase it from a publisher, a bookstore, a document delivery service, or other provider. Sometimes, the date of a document's public accessibility will involve both indexing and library date information. However, date information for indexing entries is often unavailable. This is especially true for online indices.

32. Indexing services use a wide variety of controlled vocabularies to provide subject access and other means of discovering the content of documents. The formats in which these access terms are presented vary from service to service.

33. Before the widespread development of online databases to index articles in journals, magazines, conference papers, and technical reports, libraries purchased printed volumes of indices. Graduate library school education mandated that students learn about the bibliographic control of disciplines, the prominent indexing volumes, and searching strategies required to use them effectively and

efficiently. Half of the courses that I studied in library school were focused on bibliography and resources in academic disciplines.

34. Librarians consulted with information seekers to verify citations, check availability in union catalogs, printed books catalogs, and the OCLC database, and make formal requests for materials, *e.g.*, books, conference proceedings, journal articles. Requests were transmitted using Telex machines, rudimentary email systems, and the United States Postal Service. During my career, I have performed and supervised staff who handled these resource sharing tasks.

35. A major firm known for the breadth of subjects and comprehensive treatment in the preparation of index volumes, the H. W. Wilson Company offered these reference resources since the firm was founded in 1898. The *Reader's Guide to Periodical Literature* is one of the best-known titles available from H. W. Wilson. Each volume includes a comprehensive index for 300 of the most popular and important periodicals published in the United States and Canada. Information seekers have subject access expressed in plain language terminology, author access, and cross references to find the desired results from their searches. The family of index titles included *Science & Technology Index*, *Business Periodicals*, *Applied Science & Technology Index, Humanities Index, Biological & Agricultural*

Index, and *Industrial Arts Index*. These printed indices have been superseded by digital database offerings available to information seekers through Ebsco.

36. Online indexing services commonly provide bibliographic information, abstracts, and full-text copies of the indexed publications, along with a list of the documents cited in the indexed publication. These services also often provide lists of publications that cite a given document. A citation of a document is evidence that the document was publicly available and in use no later than the publication date of the citing document.

IV. LIBRARY CATALOGING PRACTICES

A. MARC RECORDS AND THE ONLINE LIBRARY CATALOG

37. I am fully familiar with the library cataloging standard known as the MARC standard, which is an industry-wide standard method of storing and organizing library catalog information.[10] MARC was first developed in the 1960s by the Library of Congress. A MARC-compatible library is one that has a catalog consisting of individual MARC records for each of its items. Today, MARC is the

[10] The full text of the standard is available from the Library of Congress at http://www.loc.gov/marc/bibliographic/.

primary communications protocol for the transfer and storage of bibliographic metadata in libraries.[11]

38. MARC is a framework into which descriptive bibliographic data are transcribed to interact with the software in online library catalogs to provide access to books, journals, and other resources in the collection. The bibliographic data provide points of access and can be searched by a person of ordinary skill in the art ("POSITA") to identify and obtain resources in the library collection. An information seeker (or POSITA) can search a local online library catalog or the holdings of a group of libraries in a state or region or in the global catalog WorldCat.

39. MARC records are not designed for public viewing. Although a significant number of libraries provide access to the MARC version of a bibliographic record, the public display is designed to show information in a

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[11] Almost every major library in the world is MARC-compatible. *See, e.g.*, *MARC Frequently Asked Questions (FAQ)*, Library of Congress, https://www.loc.gov/marc/faq.html (last visited June 13, 2024) ("MARC is the acronym for MAchine-Readable Cataloging. It defines a data format that emerged from a Library of Congress-led initiative that began nearly forty years ago. It provides the mechanism by which computers exchange, use, and interpret bibliographic information, and its data elements make up the foundation of most library catalogs used today."). MARC is the ANSI/NISO Z39.2-1994 (reaffirmed 2016) standard for Information Interchange Format.

succinct manner that is quickly understood and useful to the information seeker. Libraries determine the default search for the online catalog to make the entry of search terms efficient and result in a successful search. Information seekers can enter a keyword, title, author, or standard number for the item. Libraries may also provide a search capability called "Summon" that allows the information seeker to enter known information about the item to conduct a search.

40. Since at least the early 1970s and continuing to the present day, MARC has been the primary communications protocol for the transfer and storage of bibliographic metadata in libraries.[12] As explained by the Library of Congress:

> You could devise your own method of organizing the bibliographic information, but you would be isolating your library, limiting its options, and creating much more work for yourself. Using the MARC standard prevents duplication of work and allows libraries to better share bibliographic resources. Choosing to use MARC enables libraries to acquire cataloging data that is predictable and reliable. If a library were to develop a "home-grown" system that did not use MARC records, it would not be taking advantage of an

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[12] A complete history of the development of MARC can be found in *MARC: Its History and Implications* by Henrietta D. Avram (Washington, DC: Library of Congress, 1975) and available online from the Hathi Trust (https://babel.hathitrust.org/cgi/pt?id=mdp.39015034388556;view=1up;seq=1; last visited June 13, 2024).

> industry-wide standard whose primary purpose is to foster communication of information.
>
> Using the MARC standard also enables libraries to make use of commercially available library automation systems to manage library operations. Many systems are available for libraries of all sizes and are designed to work with the MARC format. Systems are maintained and improved by the vendor so that libraries can benefit from the latest advances in computer technology. The MARC standard also allows libraries to replace one system with another with the assurance that their data will still be compatible.

Why Is a MARC Record Necessary? LIBRARY OF CONGRESS, http://www.loc.gov/marc/umb/um01to06.html#part2 (last visited June 13, 2024).

41. Examining the MARC records for a specific item reveals the comprehensive data transcribed about a particular item at the time that cataloging and classification occurred. In addition to the creator, title, subjects, and standard numbers, additional information may provide additional and relevant data depending on the type of resource. Understanding the full extent of bibliographic data for an item and the points of access associated with it provides essential information that can be used to determine the indexing and public availability for documents described in this Report.

B. MARC RECORDS

42. A MARC record comprises several fields, each of which contains specific data about the work. Each field is identified by a standardized, unique, three-digit code corresponding to the type of data that follow. For example, a work's title is recorded in field 245, the primary author or creator of the work is recorded in field 100, an item's International Standard Book Number ("ISBN") is recorded in field 020, an item's International Standard Serial Number ("ISSN") is recorded in field 022, an item's Library of Congress call number is recorded in field 050, and the publication date is recorded in field 260 under the subfield "c." *Id.*[13] If a work is a periodical, then its publication frequency is recorded in field 310, alternate publication frequency is recorded in field 321, and the publication dates (*e.g.*, the first and last publication) are recorded in field 362, which is also referred to as the enumeration/chronology field. *See* http://www.loc.gov/marc/bibliographic/bd3xx.html (last visited June 13, 2024).

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[13] In some MARC records, field 264 is used rather than field 260 to record publication information. *See* http://www.loc.gov/marc/bibliographic/bd264.html (last visited June 13, 2024) ("Information in field 264 is similar to information in field 260 (Publication, Distribution, etc. (Imprint)). Field 264 is useful for cases where the content standard or institutional policies make a distinction between functions").

43. The library that created the record is recorded in Field 040 in subfield "a" with a unique library code. When viewing the MARC record online via Online Computer Library Center's ("OCLC") bibliographic database, hovering over this code with the mouse reveals the full name of the library. I used this method of "mousing over" the library codes in the OCLC database to identify the originating library for the MARC records discussed in this Report. Where this "mouse over" option was not available, I consulted the Directory of OCLC Libraries to identify the institution that created the MARC record.[14]

44. MARC records also include several fields that include subject matter classification information. An overview of MARC record fields is available through the Library of Congress at http://www.loc.gov/marc/bibliographic/. For example, 6XX fields are termed "Subject Access Fields." *See* http://www.loc.gov/marc/bibliographic/bd6xx.html. Among these, for example, is the 650 field; this is the "Subject Added Entry – Topical Term" field. *See* http://www.loc.gov/marc/bibliographic/bd650.html. The 650 field is a "[s]ubject added entry in which the entry element is a topical term." *Id.* These authenticated subject entries "are assigned to a bibliographic record to provide access according to generally accepted thesaurus-building rules (*e.g.*, *Library of Congress Subject Headings* (LCSH), *Medical Subject Headings* (MeSH))." *Id.*

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[14] https://www.oclc.org/en/contacts/libraries.html

45. Further, MARC records include call numbers, which themselves indicate a subject and physical location within the library collections. For example, the 050 field is the "Library of Congress Call Number." *See* http://www.loc.gov/marc/bibliographic/bd050.html (last visited April 20, 2024). A defined portion of the Library of Congress Call Number is the classification number, and "source of the classification number is *Library of Congress Classification* and the *LC Classification-Additions and Changes*." *Id.* Thus, included in the 050 field is a subject matter classification. Each item in a library has a single classification number. A library selects a classification scheme (*e.g.*, the Library of Congress Classification scheme just described or a similar scheme such as the Dewey Decimal Classification scheme or the National Library of Medicine Classification scheme) and uses it consistently. When the Library of Congress assigns the classification number, it appears as part of the 050 field. If a local library assigns the classification number, it appears in a 090 field. In either scenario, the MARC record includes a classification number that represents a subject matter classification.

46. Each item in a library has a single classification number. A library selects a classification scheme (*e.g.*, the Library of Congress Classification scheme just described or a similar scheme such as the Dewey Decimal Classification scheme) and uses it consistently. When the Library of Congress assigns the

classification number, it appears as part of the 050 field, as discussed above. For MARC records created by libraries other than the Library of Congress (*e.g.*, a university library or a local public library), the classification number may appear in a 09X (*e.g.*, 090) field. *See* http://www.loc.gov/marc/bibliographic/bd09x.html (last visited June 13, 2024).

C. OCLC

47. The OCLC was created "to establish, maintain and operate a computerized library network and to promote the evolution of library use, of libraries themselves, and of librarianship, and to provide processes and products for the benefit of library users and libraries, including such objectives as increasing availability of library resources to individual library patrons and reducing the rate of rise of library per-unit costs, all for the fundamental public purpose of furthering ease of access to and use of the ever-expanding body of worldwide scientific, literary and educational knowledge and information."[15] Among other services, OCLC and its members are responsible for maintaining the WorldCat database (http://www.worldcat.org/), used by independent and institutional libraries throughout the world.

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[15] Third Article, Amended Articles of Incorporation of OCLC Online Computer Library Center, Incorporated (available at https://www.oclc.org/content/dam/oclc/membership/articles-of-incorporation.pdf).

48. OCLC also provides its members online access to MARC records through its OCLC bibliographic database. When an OCLC member institution acquires a work, it creates a MARC record for this work in its computer catalog system in the ordinary course of its business. MARC records created at the Library of Congress were initially tape-loaded into the OCLC database through a subscription to MARC Distribution Services daily or weekly. Once the MARC record is created by a cataloger at an OCLC member institution or is tape-loaded from the Library of Congress, the MARC record is then made available to any other OCLC members online, and therefore made available to the public. Accordingly, once the MARC record is created by a cataloger at an OCLC member institution or is tape-loaded from the Library of Congress or another library anywhere in the world, any publication corresponding to the MARC record has been cataloged and indexed according to its subject matter such that a person interested in that subject matter could, with reasonable diligence, locate and access the publication through any library with access to the OCLC bibliographic database or through the Library of Congress.

49. When an OCLC member institution creates a new MARC record, OCLC automatically supplies the date of creation for that record. The date of creation for the MARC record appears in the fixed field (008), characters 00 through 05. The MARC record creation date reflects the date on which the item

was first acquired or cataloged. Initially, field 005 of the MARC record is automatically populated with the date the MARC record was created in year, month, day format (YYYYMMDD) (some of the newer library catalog systems also include hour, minute, second (HHMMSS)). Thereafter, the library's computer system may automatically update the date in field 005 every time the library updates the MARC record (*e.g.*, to reflect that an item has been moved to a different shelving location within the library). Field 005 is visible when viewing a MARC record via an appropriate computerized interface. The initial field 005 date (*i.e.*, the date the MARC record was created) does appear. The date upon which the most recent update to field 005 occurred also appears in field 005. Thus, when an item's MARC record has been printed to hardcopy—as is the case with the exhibits to this report—the date reflected next to field 008 is necessarily on or after the date the library first cataloged and indexed the underlying item.

50. Once one library has cataloged and indexed a publication by creating a MARC record for that publication, other libraries that receive the publication do not create additional MARC records—the other libraries instead rely on the original MARC record. They may update or revise the MARC record to ensure accuracy, but they do not replace or duplicate it. This practice does more than save libraries from duplicating labor, it also enhances the accuracy of MARC records. It also allows librarians around the world to know that a particular MARC record is

authoritative. In contrast, a hypothetical system wherein duplicative records were created would result in confusion as to which record is authoritative.

51. The date of creation of the MARC record by a cataloger at an OCLC member institution reflects when the underlying item is accessible to the public. Upwards of two-thirds to three-quarters of book sales to libraries come from a jobber or wholesaler for online and print resources. These resellers make it their business to provide books to their customers as fast as possible, often providing turnaround times of only a single day after publication. Libraries purchase a significant portion of the balance of their books directly from publishers themselves, which provide delivery on a similarly expedited schedule. In general, libraries make these purchases throughout the year as the books are published and shelve the books as soon thereafter as possible in order to make the books available to their patrons. Thus, books are generally available at libraries across the country within just a few days of publication.

V. PUBLICATIONS

A. Kwark, Young H., Ron Sinton, and Richard M. Swanson. "SIPOS Heterojunction Contacts to Silicon." *Proceedings of the 1984 International Electron Devices Meeting Technical Digest* (pp. 742-745). New York: Institute of Electrical and Electronics Engineers, 1984. ("Kwark") [Exhibit 1008]

52. Attached hereto as Exhibit 1008 is a copy of a conference paper published in the *Proceedings of the 1984 International Electron Devices Meeting*

Technical Digest found in the University of Wisconsin – Madison Libraries. The conference paper titled "SIPOS Heterojunction Contacts to Silicon" by Young H. Kwark, Ron Sinton, and Richard M. Swanson (hereafter "Kwark") appears beginning on page 742. The 1984 International Electron Devices Meeting was held on December 9-12, 1984, in San Francisco, California. The Kwark conference paper was presented on December 12, 1984, at 2 p.m. as presentation 32.2 (Exhibit 1008, page viii, right-hand column). Exhibit 1008 is a true and correct copy of the Kwark conference paper (pages 742-745). I obtained this copy of the conference paper from the University of Wisconsin – Madison Libraries. Specifically, the text of the Kwark conference paper is complete; no pages are missing, and the text on each page appears to flow seamlessly from one page to the next; further, there are no visible alterations to the document. Exhibit 1008 was found within the custody of a library – a place where, if authentic, a copy of this conference proceedings volume would likely be. Exhibit 1008 is a true and correct copy in a condition that creates no suspicion about authenticity.

53. The Kwark conference paper is also available in the *IEEE Xplore* database,[16] the digital repository *Semantic Scholar*,[17] and from the Office of

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[16] https://ieeexplore.ieee.org/document/1484603

[17] https://www.semanticscholar.org/paper/SIPOS-Heterojunction-contacts-to-silicon-Kwark-Sinton/ab292c17d141a96bc14d37366fcec97f52c6735a

Scientific and Technical Information (OSTI) of the U. S. Department of Energy.[18] The OSTI entry indicates that the Kwark conference paper (document 5905985) was received by OSTI dated February 1, 1986, as seen in the print out of the OSTI webpage attached as Exhibit 1043. *IEEE Xplore* indicates that it was added to *IEEE Xplore* on August 9, 2005, as seen in Exhibit 1044[19], a webpage print out of the entry for this Kwark conference paper on *IEEE Xplore*. This means that the paper was publicly available from *IEEE Xplore* by August 9, 2005. *See also* §III.B (discussing *IEEE Xplore*).

54. Attached hereto as Attachment 1A is a true and correct copy of the MARC record for this conference proceedings volume from the University of Wisconsin – Madison Libraries online catalog. Library ownership is indicated by the presence of the library's code ("uwmadisondb") in the fourth 035 field. The library continues to update this MARC record and enhanced the MARC record to meet current cataloging rules. The most recent enhancement to the MARC record occurred on April 20, 2015, as shown in field 005 ("2015040"). I personally identified and retrieved the library catalog record which is Attachment 1A.

55. Based on finding a print copy of Exhibit 1008 in the University of Wisconsin – Madison Libraries and MARC record in its online library catalog

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[18] https://www.osti.gov/biblio/5905985

[19] https://ieeexplore.ieee.org/document/1484603

attached as Attachment 1A, it is my opinion that the book titled *Proceedings of the 1984 International Electron Devices Meeting Technical Digest* was cataloged as a monographic serial; therefore, a volume was published each year, as shown in field 310 ("Annual"). The annual volumes have been cataloged in the University of Wisconsin – Madison Libraries since April 13, 1978, as shown in field 008 ("780413"). In practice, annual volume of the conference proceedings would be received by the library each year after the conference event and indexed and catalogued at the library, and immediately made available to the public, similar to a magazine periodical.

56. Attached hereto as Attachment 1B is a true and correct copy of the MARC record for the book titled *Proceedings of the 1984 International Electron Devices Meeting Technical Digest* obtained from the OCLC bibliographic database. I personally identified and retrieved the MARC record that is Attachment 1B. As previously noted, the library that created the record is recorded in field 040 with a unique library code. For Attachment 1B, that library code is "TOL," which means that the MARC record for this conference proceedings volume was cataloged at the University of Toledo Library (Toledo, Ohio). As can be seen in the MARC record for this exhibit, a cataloger at the University of Toledo Library created OCLC record number 3799851 on April 13, 1978, as shown in field 008 ("780413"). This means that University of Toledo Library has been subscribing

and receiving the annual volumes of the conference publication since April 13, 1978, as well, and making them available to the public once indexed, catalogued and received. The library community continues to update this MARC record to meet current cataloging rules. The most recent enhancement to the MARC record occurred on October 23, 2023, as shown in field 005 ("20231023").

57. Attachment 1B further includes an entry in field 050 ("TK7801 $b .I53")—as described above, a subject matter classification number consistent with the Library of Congress classification system (analogous to the Dewey Decimal classification system) and an entry in field 082 ("621.381/028")—as described above, a subject matter classification number consistent with the Dewey Decimal classification system. Attachment 1B also shows that Exhibit 1008 was catalogued with a descriptor term reading "Electronic apparatus and appliances $v Congresses" (see Attachment 1C, Library of Congress subject heading sh2008102918) in the 650 field. Thus, as of its cataloging, the publication corresponding to the MARC record attached hereto as Attachment 1B was indexed according to its subject matter by virtue of at least three independently sufficient classifications: the field 050 entry, the field 082 entry, and the field 650 entry.

58. WorldCat indicates that the book titled *Proceedings of the 1984 International Electron Devices Meeting Technical Digest* as cataloged at the

University of Toledo Library is currently available from 258 libraries.[20] This shows that the Kwark conference publication was widely available. The Kwark conference paper has also been cited in U.S. Patent No. 5,661,079 that issued on August 26, 1997, as seen from Exhibit 1045 citing Kwark on the cover page. In view of the above, it is my opinion that Exhibit 1008 is an authentic copy of the Kwark conference paper, and was publicly available widely through public libraries. And given that it was cited by a patent (EX1045), it certainly was publicly available no later than the issue date of that patent, *i.e.*, August 26, 1997. And it was publicly disseminated no later than August 9, 2005, when it was added to and available for download from *IEEE Xplore*, and in any event before February 20, 2007.

B. Sivoththaman, S., W. Laureys, P. De Schepper, J. Nijs, and R. Mertens. "Rapid Thermal Processing of Conventionally and Electromagnetically Cast 100 cm2 Multicrystalline Silicon." *Conference Record of the 25th IEEE Photovoltaic Specialists Conference* (pp. 621-624). New York; Piscataway, NJ: Institute of Electrical and Electronics Engineers; IEEE Service Center, 1996. ("Sivoththaman") [Exhibit 1013]

59. Attached hereto as Exhibit 1013 is a copy of a conference paper published in the *Conference Record of the 25th IEEE Photovoltaic Specialists Conference* found in the University of Wisconsin – Madison Libraries. The conference paper titled "Rapid Thermal Processing of Conventionally and

[20] https://search.worldcat.org/title/3799851

Electromagnetically Cast 100 cm2 Multicrystalline Silicon" by S. Sivoththaman, W. Laureys, P. De Schepper, J. Nijs, and R. Mertens (hereafter "Sivoththaman") appears beginning on page 621. The 25th IEEE Photovoltaic Specialists Conference was held on May 13-17, 1996, in Washington, DC. The Sivoththaman conference paper was presented as part of Section IV, Silicon Materials and Devices (Exhibit 1013, pages iii and v, right-hand columns). Exhibit 1013 is a true and correct copy of the Sivoththaman conference paper (pages 621-624). I obtained this copy of the conference paper from the University of Wisconsin – Madison Libraries. Specifically, the text of the Sivoththaman conference paper is complete; no pages are missing, and the text on each page appears to flow seamlessly from one page to the next; further, there are no visible alterations to the document. Exhibit 1013 was found within the custody of a library – a place where, if authentic, a copy of this conference proceedings volume would likely be. Exhibit 1013 is a true and correct copy in a condition that creates no suspicion about authenticity.

60. The Sivoththaman conference paper is also available in the *IEEE Xplore* database[21] and the imec[22] publications digital repository.[23] *IEEE Xplore*

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[21] https://ieeexplore.ieee.org/document/564205

[22] https://www.imec-int.com/en/about-us

[23] https://imec-publications.be/handle/20.500.12860/1499

indicates that it was added to *IEEE Xplore* on August 6, 2002, as seen from Exhibit 1049, a webpage print out of the entry for the Sivoththaman conference paper on *IEEE Xplore*. This means that the paper was publicly available for download from *IEEE Xplore* by August 6, 2002. *See also* §III.B (discussing *IEEE Xplore*).

61. Attached hereto as Attachment 2A is a true and correct copy of the MARC record for this conference proceedings volume from the University of Wisconsin – Madison Libraries online catalog. Library ownership is indicated by the presence of the library's code ("uwmadisondb") in the fourth 035 field. The library continues to update this MARC record and enhanced the MARC record to meet current cataloging rules. The most recent enhancement to the MARC record occurred on March 22, 2018, as shown in field 005 ("2180322"). I personally identified and retrieved the library catalog record which is Attachment 2A.

62. Based on finding a print copy of Exhibit 1013 in the University of Wisconsin – Madison Libraries and MARC record in its online library catalog attached as Attachment 2A, it is my opinion that the book titled *Conference Record of the 25th IEEE Photovoltaic Specialists Conference* was cataloged as a monographic serial; therefore, a volume was published each year, as shown in field 310 ("Irregular"). The volumes have been cataloged in the University of Wisconsin – Madison Libraries since February 10, 1982, as shown in field 008 ("820210"). In practice, annual volume of the conference proceedings would be received by the

library each year after the conference event and indexed and catalogued at the library, and immediately made available to the public.

63. Attached hereto as Attachment 2B is a true and correct copy of the MARC record for the book titled *Conference Record of the 25th IEEE Photovoltaic Specialists Conference* obtained from the OCLC bibliographic database. I personally identified and retrieved the MARC record that is Attachment 2B. As previously noted, the library that created the record is recorded in field 040 with a unique library code. For Attachment 2B, that library code is "COD," which means that the MARC record for this conference proceedings volume was cataloged at the University of Colorado – Boulder Libraries. As can be seen in the MARC record for this exhibit, a cataloger at the University of Colorado – Boulder Libraries created OCLC record number 8145880 on February 10, 1982, as shown in field 008 ("820210"). This means that University of Colorado – Boulder Libraries has been subscribing and receiving the annual volumes of the conference publication since April 13, 1978, as well, and making them available to the public once indexed, catalogued and received, similar to a magazine periodical. The library community continues to update this MARC record to meet current cataloging rules. The most recent enhancement to the MARC record occurred on November 1, 2023, as shown in field 005 ("20231101").

64. Attachment 2B further includes an entry in field 050 ("TK2960 $b .P48a")—as described above, a subject matter classification number consistent with the Library of Congress classification system (analogous to the Dewey Decimal classification system) and an entry in field 082 ("537")—as described above, a subject matter classification number consistent with the Dewey Decimal classification system. Attachment 2B also shows that Exhibit 1013 was catalogued with two descriptor terms reading "Photovoltaic power generation $v Congresses" (see Attachment 2C, Library of Congress subject heading sh2010106196) and "Solar batteries $v Congresses" (see Attachment 2D, Library of Congress subject heading sh85124490 and Attachment 2E, Library of Congress subject heading sh85031115) in the 650 fields. Thus, as of its cataloging, the publication corresponding to the MARC record attached hereto as Attachment 2B was indexed according to its subject matter by virtue of at least three independently sufficient classifications: the field 050 entry, the field 082 entry, and the field 650 entries.

65. WorldCat indicates that the book titled *Conference Record of the 25th IEEE Photovoltaic Specialists Conference* as cataloged at the University of Colorado – Boulder Libraries is currently available from about 298 libraries.[24] This shows that the Sivoththaman conference publication was widely available. For

[24] https://search.worldcat.org/title/35958265

example, the Sivoththaman conference publication has been cited in several publications by others, including, for example, by:

- P. Doshi, J. Mejia, K. Tate and A. Rohatgi, "Modeling and characterization of high-efficiency silicon solar cells fabricated by rapid thermal processing, screen printing, and plasma-enhanced chemical vapor deposition," in IEEE Transactions on Electron Devices, vol. 44, no. 9, pp. 1417-1424, Sept. 1997 (EX1050); *see also* EX1056 (*IEEE Xplore* entry listing references);
- P. Doshi and A. Rohatgi, "18% efficient silicon photovoltaic devices by rapid thermal diffusion and oxidation," in IEEE Transactions on Electron Devices, vol. 45, no. 8, pp. 1710-1716, Aug. 1998 (EX1051); *see also* EX1057 (*IEEE Xplore* entry listing references)
- A. Rohatgi, P. Doshi, J. Moschner, T. Lauinger, A. G. Aberle and D. S. Ruby, "Comprehensive study of rapid, low-cost silicon surface passivation technologies," in IEEE Transactions on Electron Devices, vol. 47, no. 5, pp. 987-993, May 2000 (EX1052); *see also* EX1058 (*IEEE Xplore* entry listing references).

In view of the above, it is my opinion that Exhibit 1013 is an authentic copy of the Sivoththaman conference publication and was published and publicly accessible by September 1997 as seen from the citations in publication by others. And it was

publicly disseminated no later than on August 6, 2002, when it was added to and publicly disseminated from *IEEE Xplore*., and in any event before February 20, 2007.

C. *Handbook of Photovoltaic Science and Engineering*, edited by Antonio Luque and Steven Hegedus. Hoboken, NJ: Wiley, c2003. ("Luque") [Exhibit 1019]

66. Attached hereto as Exhibit 1019 is a copy of excerpts from a book titled *Handbook of Photovoltaic Science and Engineering* edited by Antonio Luque and Steven Hegedus (hereafter "Luque") and issued by Wiley and Sons with a 2003 copyright date. Exhibit 1019 is a true and correct copy of excerpts from Luque that include the title page, copyright page, table of contents, pages 107-109, and Chapter 7, "Crystalline Silicon Solar Cells and Modules" by Ignacio Tobías, Carlos del Cañizo, and Jesús Alonso on pages 255-306. I obtained this excerpted copy from the Library of Congress. The text in the full version from which Exhibit 1019 is excerpted is complete; no pages are missing, and the text on each page appears to flow seamlessly from one page to the next; further, there are no visible alterations to the document. Exhibit 1019 is a true and correct copy of excerpts of a book in a condition that creates no suspicion about its authenticity.

67. Attached hereto as Attachment 3A is a true and correct copy of the MARC record for this monograph from the Library of Congress online catalog. Library ownership is indicated by the presence of the library's code ("DLC") in the

049 field. The library continues to update and enhance this MARC record to meet current cataloging rules. The most recent enhancement to the MARC record occurred on April 5, 2014, as shown in field 005 ("20140405"). I personally identified and retrieved the library catalog record which is Attachment 3A.

68. For Attachment 3A, the library code "DLC" means that the MARC record for this book was created at the Library of Congress as part of the Cataloging in Publication (CIP) Program.[25] A cataloger prepares basic information about the forthcoming book which is included on the verso of the title page (also called the copyright page). The information is provided to save time needed for the cataloging process at the library after the book is purchased. The CIP data includes the author (field 100), title and subtitle (field 245), ISBN (field 022), suggested subject headings (field 650), classification numbers for the Library of Congress classification number (field 050), and the Dewey Decimal classification number (field 082). These data elements are included in the MARC record that the Library of Congress contributes to the OCLC bibliographic database. In field 955 of Attachment 3A, the MARC record for this exhibit, the text "2003-07-29 1 copy rec'd., to CIP ver." means a copy of the exhibit was received and sent to CIP at the Library of Congress for verification. Field 955 also states "2003-08-07 to BCCD, copy 1," which means a copy of the exhibit was sent to Bindings and Collections

[25] https://www.loc.gov/publish/cip/.

Care (BCCD) at the Library of Congress and was available for review by the public on that date or shortly thereafter.

69. Based on finding a print copy of the Luque book in the Library of Congress and MARC record in its online library catalog attached as Attachment 3A, it is my opinion that the book titled *Handbook of Photovoltaic Science and Engineering* was publicly available on or shortly after August 7, 2003. The International Standard Book Number (ISBN) on Exhibit 1019 (0-471-49196-9) matches the ISBN in the first field 020 of Attachment 3A. Therefore, Exhibit 1019 contains excerpts of Luque, which are identical to the copy the cataloger at the Library of Congress used to create the MARC record that is Attachment 3A.

70. Attached hereto as Attachment 3B is a true and correct copy of the MARC record for the book *Handbook of Photovoltaic Science and Engineering* obtained from the OCLC bibliographic database. I personally identified and retrieved the MARC record that is Attachment 3B. As previously noted, the library that created the record is recorded in field 040 with a unique library code. For Attachment 3B, that library code is "DLC," which means that the MARC record for this book was created at the Library of Congress. As can be seen in the "Date Entered on File" field in the MARC record for this exhibit, a cataloger at the Library of Congress created OCLC record number 50912809 on October 25, 2002, as shown infield 008 ("021025"). This reflects the date the record was created

prior to the Library of Congress receiving a copy, which, as shown by Attachment 3A at field 955, occurred by July 29, 2003, with the copy sent to BCCD for availability on or shortly after August 7, 2003. The library continues to update and enhance this MARC record to meet current cataloging rules. The most recent enhancement to Attachment 3B occurred on February 2, 2024, as shown in field 005 ("20240202").

71. Attachment 3B further includes an entry in field 050 ("TK8322 $b .H33 2003")—as described above, this includes a subject matter classification number consistent with the Library of Congress classification system (analogous to the Dewey Decimal classification system) and an entry in field 082 ("621.31/244"), a subject matter consistent with the Dewey Decimal classification system. Attachment 3B further includes two descriptor terms reading "Photovoltaic cells $v Handbooks, manuals, etc." (see Attachment 3C, Library of Congress subject heading sh89006119 and Attachment 3D, Library of Congress genre heading gf2014026109) and "Photovoltaic power generation $v Handbooks, manuals, etc." (see Attachment 3E, Library of Congress subject heading sh2010106196 and Attachment 3D, Library of Congress genre heading gf2014026109) in the 650 fields. Thus, as of its cataloging, the publication corresponding to the MARC record attached hereto as Attachment 3B was indexed according to its subject matter by virtue of at least three independently sufficient

classifications: the field 050 entry, the field 082 entry, and the field 650 entries. Further, as of October 25, 2002, the MARC record attached hereto as Attachment 3B was accessible through any library with access to the OCLC bibliographic database or the online catalog at a library that added this book to its collection, which means that the corresponding publication was publicly available on or before that same date through any library with access to the OCLC bibliographic database or through an individual library.

72. WorldCat indicates that the Luque book as cataloged at the Library of Congress is currently available from 1,210 libraries.[26] In view of above, it is my opinion that Exhibit 1019 is an authentic excerpted copy of the Luque monograph, and the Luque monograph was publicly available on or shortly after August 7, 2003, because by that date it had been received, cataloged, and indexed at the Library of Congress, made part of the OCLC bibliographic database, and sent to BCCD at the Library of Congress for public availability. For these reasons, it is my opinion that Exhibit 1019 was published and accessible to the public on or shortly after August 7, 2003, and in any event before February 20, 2007.

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[26] https://search.worldcat.org/title/50912809

D. Gan, Jon-Yiew, and R. M. Swanson. "Polysilicon Emitters for Silicon Concentrator Solar Cells." *Conference Record of the 21st IEEE Conference on Photovoltaic Specialists*, 2 vols. (vol 1, pp. 245-250). New York, Institute of Electrical and Electronics Engineers, 1990. ("Gan") [Exhibit 1007]

73. Attached hereto as Exhibit 1007 is a copy of a conference paper published in the two-volume set titled *Conference Record of the 21st IEEE Conference on Photovoltaic Specialists* found in the University of Wisconsin – Madison Libraries. The conference paper titled "Polysilicon Emitters for Silicon Concentrator Solar Cells" by Jon-Yiew Gan and R. M. Swanson (hereafter "Gan") appears beginning on page 245 in volume 1. The 21st IEEE Conference on Photovoltaic Specialists was held on May 21-25, 1990, in Kissimmee, Florida. The Gan conference paper was presented as part of the section titled Silicon Solar Cells (Exhibit 1007, pages ii (right-hand column) and iii (left-hand column)). Exhibit 1007 is a true and correct copy of the Gan conference paper (volume 1, pages 245-250). I obtained this copy of the conference paper from the University of Wisconsin – Madison Libraries. Specifically, the text of the Gan conference paper is complete; no pages are missing, and the text on each page appears to flow seamlessly from one page to the next; further, there are no visible alterations to the document. Exhibit 1007 was found within the custody of a library – a place where, if authentic, a copy of this two-volume set of conference proceedings would likely

be. Exhibit 1007 is a true and correct copy in a condition that creates no suspicion about authenticity.

74. The Gan conference paper is also available in the *IEEE Xplore* database[27] and the digital repository *Semantic Scholar*.[28] *IEEE Xplore* indicates that it was added to *IEEE Xplore* on August 6, 2002, as seen from Exhibit 1046, a webpage print out of the entry for the Gan paper on *IEEE Xplore*. This means that the paper was publicly available for download from *IEEE Xplore* by August 6, 2002. *See also* §III.B (discussing *IEEE Xplore*).

75. Attached hereto as Attachment 4A is a true and correct copy of the MARC record for this two-volume set of conference proceedings from the University of Wisconsin – Madison Libraries online catalog. Library ownership is indicated by the presence of the library's code ("uwmadisondb") in the fourth 035 field. The library continues to update and enhance the MARC record to meet current cataloging rules. The most recent enhancement to the MARC record occurred on March 22, 2018, as shown in field 005 ("2180322"). I personally identified and retrieved the library catalog record which is Attachment 4A.

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[27] https://ieeexplore.ieee.org/document/111625

[28] https://www.semanticscholar.org/paper/Polysilicon-emitters-for-silicon-concentrator-solar-Gan-Swanson/d5d60839bc8babc9ac44651f18f8cf302261a0bb

76. Based on finding a print copy of Exhibit 1007 in the University of Wisconsin – Madison Libraries and MARC record in its online library catalog attached as Attachment 4A, it is my opinion that the two-volume set of conference proceedings titled *Conference Record of the 21st IEEE Conference on Photovoltaic Specialists* was cataloged as a monographic serial; therefore, a volume or set of volumes was published each year, as shown in field 310 ("Irregular"). The volumes have been cataloged in the University of Wisconsin – Madison Libraries since February 10, 1982, as shown in field 008 ("820210"). In practice, annual volume of the conference proceedings would be received by the library each year after the conference event and indexed and catalogued at the library, and immediately made available to the public, similar to a magazine periodical.

77. Attached hereto as Attachment 4B is a true and correct copy of the MARC record for the two-volume set of conference proceedings titled *Conference Record of the 21st IEEE Conference on Photovoltaic Specialists* obtained from the OCLC bibliographic database. I personally identified and retrieved the MARC record that is Attachment 4B. As previously noted, the library that created the record is recorded in field 040 with a unique library code. For Attachment 4B, that library code is "COD," which means that the MARC record for this two-volume set of conference proceedings was cataloged at the University of Colorado – Boulder Libraries. As can be seen in the MARC record for this exhibit, a cataloger

at the University of Colorado – Boulder Libraries created OCLC record number 8145880 on February 10, 1982, as shown in field 008 ("820210"). This means that University of Colorado – Boulder Libraries have been subscribing and receiving the annual volumes of the conference publication since February 10, 1982, and would have been making them available to the public once indexed, catalogued and received. The library community continues to update this MARC record the MARC record to meet current cataloging rules. The most recent enhancement to the MARC record occurred on November 1, 2023, as shown in field 005 ("20231101").

78. Attachment 4B further includes an entry in field 050 ("TK2960 $b .P48a")—as described above, a subject matter classification number consistent with the Library of Congress classification system (analogous to the Dewey Decimal classification system) and an entry in field 082 ("537")—as described above, a subject matter classification number consistent with the Dewey Decimal classification system. Attachment 4B also shows that Exhibit 1007 was catalogued with two descriptor terms reading "Photovoltaic power generation $v Congresses" (see Attachment 2C, Library of Congress subject heading sh2010106196) and "Solar batteries $v Congresses" (see Attachment 2D, Library of Congress subject heading sh85124490 and Attachment 2E, Library of Congress subject heading sh85031115) in the 650 fields. Thus, as of its cataloging, the publication

corresponding to the MARC record attached hereto as Attachment 4B was indexed according to its subject matter by virtue of at least three independently sufficient classifications: the field 050 entry, the field 082 entry, and the field 650 entries.

79. WorldCat indicates that the two-volume set of conference proceedings titled *Conference Record of the 21st IEEE Conference on Photovoltaic Specialists* as cataloged at the University of Colorado – Boulder Libraries is currently available from 70 libraries.[29] This shows that the Gan conference publication was widely available. For example, Gan has been cited at page 1378, reference 3, in M. Lemiti, B. Semmache, Q. N. Le, D. Barbier and A. Laugier, "Physical properties of RT-LPCVD and LPCVD polysilicon thin films: application to emitter solar cell," Proceedings of 1994 IEEE 1st World Conference on Photovoltaic Energy Conversion - WCPEC (A Joint Conference of PVSC, PVSEC ands PSEC), Waikoloa, HI, USA, 1994, pp. 1375-1378 vol.2., as seen from Exhibit 1047 and 1048. In view of the above, it is my opinion that Exhibit 1007 is an authentic copy of the Gan conference publication and was published and publicly accessible by 1994 as seen from it being cited by others in their publication. It was further publicly disseminated no later than on August 6, 2002, when it was added to and available for download from *IEEE Xplore,* and in any event before February 20, 2007.

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[29] https://search.worldcat.org/title/23087241

E. Hartiti, B., S. Sivoththaman, R. Schindler, J. Nijs, J. C. Muller, and P. Siffert. "Low Temperature Formation of Emitter and EEF by Rapid Thermal Co-Diffusion of P, AI or B." ***1994 IEEE 1st World Conference on Photovoltaic Energy Conversion - WCPEC 1994.*** **2 vols. (vol. 2, pp. 1519-1522). Piscataway, NJ: IEEE, 1994. ("Hartiti") [Exhibit 1012]**

80. Attached hereto as Exhibit 1012 is a copy of a conference paper published in the two-volume set titled *1994 IEEE 1st World Conference on Photovoltaic Energy Conversion - WCPEC 1994* found in the University of Iowa Libraries (Iowa City, Iowa). The conference paper titled "Low Temperature Formation of Emitter and EEF by Rapid Thermal Co-Diffusion of P, AI or B" by B. Hartiti, S. Sivoththaman, R. Schindler, J. Nijs, J. C. Muller, and P. Siffert (hereafter "Hartiti") appears beginning on page 1519 in volume 2. The IEEE 1st World Conference on Photovoltaic Energy Conversion was held on December 5-9, 1994, in Waikoloa, Hawaii. The Hartiti conference paper was presented as part of the section titled 1P2 Crystalline Silicon Devices (Exhibit 1012, page xiv (left-hand column) and xiv (right-hand column). Exhibit 1012 is a true and correct copy of the Hartiti conference paper (volume 2, pages 1519-1522). I obtained this copy of the conference paper from the University of Iowa Libraries.[30] Specifically, the text of the Hartiti conference paper is complete; no pages are missing, and the text

[30] The University of Iowa Libraries does not include a display of the MARC record for Exhibit 1013.

on each page appears to flow seamlessly from one page to the next; further, there are no visible alterations to the document. Exhibit 1012 was found within the custody of a library – a place where, if authentic, a copy of this two-volume set of conference proceedings would likely be. Exhibit 1012 is a true and correct copy in a condition that creates no suspicion about authenticity.

81. The Hartiti conference paper is also available in the *IEEE Xplore* database[31] and indicates an August 6, 2002, addition date, as seen from Exhibit 1053, a webpage print out of the entry for the Hartiti conference paper on *IEEE Xplore*. This means that the paper was publicly available from *IEEE Xplore* by August 6, 2002. *See also* §III.B (discussing *IEEE Xplore*).

82. Attached hereto as Attachment 5A is a true and correct copy of the MARC record for the two-volume set of conference proceedings titled *1994 IEEE 1st World Conference on Photovoltaic Energy Conversion - WCPEC 1994* obtained from the OCLC bibliographic database. I personally identified and retrieved the MARC record that is Attachment 5A. As previously noted, the library that created the record is recorded in field 040 with a unique library code. For Attachment 5A, that library code is "SOE," which means that the MARC record for this two-volume set of conference proceedings was cataloged at the National Renewable Energy Laboratory Library (Lakewood, Colorado). As can be seen in

[31] https://ieeexplore.ieee.org/document/520502

the MARC record for this exhibit, a cataloger at the National Renewable Energy Laboratory Library created OCLC record number 32733538 on June 29, 1995, as shown in field 008 ("950629"), thus reflecting that the document was in the possession of the library and publicly accessible at least as of that date. The library community continues to update this MARC record to meet current cataloging rules. The most recent enhancement to the MARC record occurred on April 15, 2023, as shown in field 005 ("2020415").

83. Attachment 5A further includes an entry in field 050 ("TK2960 $b .I34 1994")—as described above, a subject matter classification number consistent with the Library of Congress classification system (analogous to the Dewey Decimal classification system) and an entry in field 082 ("621.31244")—as described above, a subject matter classification number consistent with the Dewey Decimal classification system. Attachment 5A also shows that Exhibit 1007 was catalogued with two descriptor terms reading "Photovoltaic power generation $v Congresses" (see Attachment 2C, Library of Congress subject heading sh2010106196) and "Photovoltaic cells $v Congresses" (see Attachment 3C, Library of Congress subject heading sh89006119 and Attachment 2E, Library of Congress subject heading sh85031115) in the 650 fields. Thus, as of its cataloging, the publication corresponding to the MARC record attached hereto as Attachment 5A was indexed according to its subject matter by virtue of at least three

independently sufficient classifications: the field 050 entry, the field 082 entry, and the field 650 entries. Further, as of June 29, 1995, the MARC record attached hereto as Attachment 5A was accessible through any library with access to the OCLC bibliographic database or the online catalog at a library that acquired the two-volume set of conference proceedings, which means that the corresponding publication was publicly available on or before that same date through any library with access to the OCLC bibliographic database or through an individual library.

84. WorldCat indicates that the two-volume set of conference proceedings titled *1994 IEEE 1st World Conference on Photovoltaic Energy Conversion - WCPEC 1994* as cataloged at the National Renewable Energy Laboratory Library is currently available from 327 libraries.[32] In view of the above, the print version of the two-volume set of conference proceedings titled *1994 IEEE 1st World Conference on Photovoltaic Energy Conversion - WCPEC 1994* was publicly available on June 29, 1995, because by that date it had been received, cataloged, and indexed in the National Renewable Energy Laboratory Library and made part of the OCLC bibliographic database. For these reasons, it is my opinion that Exhibit 1012 is an authentic copy of the Hartiti conference paper and was published and publicly accessible on June 29, 1995.

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[32] https://search.worldcat.org/title/32733538

85. The Hartiti conference paper was further publicly disseminated no later than on August 6, 2002, when it was added to and available from *IEEE Xplore*. It was also known and cited by others in their publication before 2003 including, for example, by:

- August 9, 2002 International Search Report of PCT Publication No. 02/103810A1 (EX1055).
- A. M. Jorgensen, T. Clausen and O. Leistiko, "Novel light trapping scheme for thin crystalline cells utilizing deep structures on both wafer sides [solar cells]," Conference Record of the Twenty Sixth IEEE Photovoltaic Specialists Conference - 1997, Anaheim, CA, USA, 1997, pp. 263-266 (EX1054); *see also* EX1059 (*IEEE Xplore* entry listing references).

86. For these reasons, it is my further opinion that Exhibit 1012 was publicly disseminated no later than August 6, 2002, and in any event before February 20, 2007.

87. In signing this Report, I recognize that the Report will be filed as evidence in a case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-

examination within the United States during the time allotted for cross-examination.

Attachment 1A

MARC Bibliographic Record

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510    1_    $aIndex to IEEE publications$x0099-1368

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710    2_    $aIEEE Group on Electron Devices.

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730    0_    $aIEEE Xplore conferences.

780    00    $tInternational Electron Devices Meeting$w(OCoLC)10447449

856    41    $zAvailable through IEEE Xplore$uhttp://ieeexplore.ieee.org/servlet/opac?punumber=1000245

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246    3_    $aIEDM technical digest
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310        $aAnnual

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338        $aonline resource$bcr$2rdacarrier

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506        $3Use copy$fRestrictions unspecified$2star$5MiAaHDL

515        $aSome years in multiple v.

538        $aMaster and use copy. Digital master created according to Benchmark for Faithful Digital
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588        $aDescription based on print version record.

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650    _0  $aElectronic apparatus and appliances$vCongresses.

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710 2_ $aIEEE Electron Devices Society.

906 $aCONFERENCE

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Attachment 1B

Bibliographic Record - OCLC Number: 3799851

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	Date1/Beginning Date of Publication	'1973'
	Date2/Ending Date of Publication	'9999'
	Place of Publication, Production, or Execution Code	'nyu' - New York
	Frequency	'a' - Annual
	Regularity	'r' - Regular
	Type of Continuing Resource	' ' - None of the following
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550 Sponsored by: IEEE Group on Electron Devices, <1973-1975>; Electron Devices Society of IEEE, <1977-1982>.
588 Latest issue consulted: 2006.
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856 4 1 **$u** http://ieeexplore.ieee.org/xpl/conhome.jsp?punumber=1000245

Attachment 1C

LC control no.: sh2008102918

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667 __ |**a** Record generated for validation purposes.

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953 __ |**a** te00

Save, Print or Email Records (View Help)

Select Download Format: Text (Labelled Display) Press to SAVE or PRINT

Email Text (Labelled Display) to: Press to SEND EMAIL

Library of Congress
URL: https://www.loc.gov/

Mailing Address:
101 Independence Ave, S.E.
Washington, DC 20540

Library of Congress Authorities
URL: http://authorities.loc.gov/
Library of Congress Online Catalog
URL: https://catalog.loc.gov/

Questions, comments, error reports: Contact Us

Attachment 2A

MARC Bibliographic Record

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260 3 **$3** <2012-> : **$a** Piscataway, NJ : **$b** IEEE ; **$a** Red Hook, NY : **$b** Available from Cu rran Associates, Inc.
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588 Latest issue consulted: 38th (2012).
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710 2 Institute of Electrical and Electronics Engineers.

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776 0 8 **$i** Online version: **$a** IEEE Photovoltaic Specialists Conference. **$t** Conference record of the ... IEEE Photovoltaic Specialists Conference **$x** 2995-1755 **$w** (DLC) 2023203 529 **$w** (OCoLC)643977024

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450 __ |**a** Symposia

450 __ |**a** Symposiums

550 __ |**w** g |**a** Intellectual cooperation

550 __ |**a** Convention facilities

670 __ |**a** Random House Kernerman Webster's college dictionary, ©2010, via TheFreeDictionary.com, Aug. 29, 2013 |**b** (colloquium n., pl. -quiums, -quia a conference at which scholars or other experts present papers on and discuss a specific topic)

670 __ |**a** The American heritage dictionary of the English language, ©2000, via TheFreeDictionary.com, Aug. 29, 2013 |**b** (colloquium n. pl. colloquiums or colloquia 1. An informal meeting for the exchange of views. 2. An academic seminar on a broad field of study, usually led by a different lecturer at each meeting.)

670 __ |**a** Merriam-Webster online, Aug. 29, 2013 |**b** (colloqium plural colloquiums or -quia: a usually academic meeting at which specialists deliver addresses on a topic or on related topics and then answer questions relating to them)

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300	__	|**a** xxvii, 1138 p. : |**b** ill. ; |**c** 26 cm.
504	__	|**a** Includes bibliographical references and index.
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650	_0	|**a** Photovoltaic power generation |**v** Handbooks, manuals, etc.
700	1_	|**a** Luque, A. |**q** (Antonio)

700	1_	|**a** Hegedus, Steven.
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856	42	|**3** Publisher description |**u** http://www.loc.gov/catdir/description/wiley036/2002191033.html
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260 Hoboken, NJ : **$b** Wiley, **$c** ©2003.

300 xxvii, 1138 pages : **$b** illustrations ; **$c** 26 cm

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504 Includes bibliographical references and index.

505 0 0 **$g** 1. **$t** Status, Trends, Challenges and the Bright Future of Solar Electricity from Photovoltaics / **$r** Steven S. Hegedus and Antonio Luque -- **$g** 2. **$t** Motivation for Photovoltaic Application and Development / **$r** Joachim Luther -- **$g** 3. **$t** The Physics of the Solar Cell / **$r** Jeffrey L. Gray -- **$g** 4. **$t** Theoretical Limits of Photovoltaic Conversion / **$r** Antonio Luque and Antonio Marti -- **$g** 5. **$t** Solar Grade Silicon Feedstock / **$r** Bruno Ceccaroli and Otto Lohne -- **$g** 6. **$t** Bulk Crystal Growth and Wafering for PV / **$r** W. Koch, A.L. Endros, D. Franke, C. Hassler, J.P. Kalejs and H.J. Moller -- **$g** 7. **$t** Crystalline Silicon Solar Cells and Modules / **$r** Ignacio Tobias, Carlos del Canizo and Jesus Alonso -- **$g** 8. **$t** Thin-film Silicon Solar Cells / **$r** Bhushan Sopori -- **$g** 9. **$t** High-Efficiency III-V Multijunction Solar Cells / **$r** J.M. Olson, D.J. Friedman and Sarah Kurtz -- **$g** 10. **$t** Space Solar Cells and Arrays / **$r** Sheila Bailey and Ryne Raffaelle -- **$g** 11. **$t** Photovoltaic Concentrators / **$r** Richard M. Swanson -- **$g** 12. **$t** Amorphous Silicon-based Solar Cells / **$r** Xunming Deng and Eric A. Schiff -- **$g** 13. **$t** Cu(InGa)Se[subscript 2] Solar Cells / **$r** William N. Shafarman and Lars Stolt -- **$g** 14. **$t** Cadmium Telluride Solar Cells / **$r** Brian E. McCandless and James R. Sites -- **$g** 15. **$t** Dye-sensitized Solar Cells / **$r** Kohjiro Hara and Hironori Arakawa -- **$g** 16. **$t** Measurement and Characterization of Solar Cells and Modules / **$r** Keith Emery -- **$g** 17. **$t** Photovoltaic Systems / **$r** Klaus Preiser -- **$g** 18. **$t** Electrochemical Storage for Photovoltaics / **$r** Dirk Uwe Sauer -- **$g** 19. **$t** Power Conditioning for Photovoltaic Power Systems / **$r** Jurgen Schmid and Heribert Schmidt -- **$g** 20. **$t** Energy Collected and Delivered by PV Modules / **$r** Eduardo Lorenzo -- **$g** 21. **$t** Economic Analysis and Environmental Aspects of Photovoltaic Systems / **$r** Richard A. Whisnant, Stephen A. Johnston and James H. Hutchby -- **$g** 22. **$t** PV in Architecture / **$r** Tjerk H. Reijenga -- **$g** 23. **$t** Photovoltaics and Development / **$r** Jorge M. Huacuz and Lalith

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650 6 Cellules photovoltaïques **$v** Guides, manuels, etc.

650 6 Conversion photovoltaïque **$v** Guides, manuels, etc.

650 7 Photovoltaic cells **$2** fast

650 7 Photovoltaic power generation **$2** fast

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650 7 Solarzelle **$2** gnd

655 7 Handbooks and manuals **$2** fast

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700 1 Luque, A. **$q** (Antonio) **$1** https://id.oclc.org/worldcat/entity/E39PBJd3RRCXPxBPh RF8XtjV4q

700 1 Hegedus, Steven.

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856 4 1 **$3** Table of contents **$u** http://catdir.loc.gov/catdir/toc/wiley041/2002191033.html

856 4 1 **$u** http://lib.myilibrary.com/?id=55412&entityid=https://netlogin.strath.ac.uk/shibbole th **$z** to access electronic resource

856 4 2 **$3** Book review (E-STREAMS) **$u** http://www.e-streams.com/es0706/es0706_3291.ht ml

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455 __ |**a** Enchiridia

455 __ |**a** Enchiridions

455 __ |**a** Manuals

455 __ |**a** Pocket companions

455 __ |**a** Vade-mecums

555 __ |**w** g |**a** Instructional and educational works

555 __ |**w** g |**a** Reference works

670 __ |**a** Genre terms : a thesaurus for use in rare book and special collections cataloging, via WWW, July 30, 2014 |**b** (Manuals (Handbooks). UF Handbooks. BT Instructional works (Gathering term; do not assign). NT Drawing books; Emigrant guides; Merchant manuals; Military manuals; Pilot guides; Writing books)

670 __ |**a** Art & architecture thesaurus online, July 30, 2014 |**b** (handbooks. Portable books, treatises, or compendiums, covering one or more subjects, arranged for quick location of information and of a size such as may conveniently be held in the hand. Examples are instructional manuals and guides to museums' collections; manuals (instructional materials). Books or treatises, often compendious, containing rules or instructions needed to perform tasks, operations, processes, occupations, arts, or studies, and intended to be used as reference while the task or study is performed.)

670 __ |**a** Reitz, J.M. ODLIS : online dictionary for library and information science, July 30, 2014 |**b** (handbook: A single-volume reference book of compact size that provides concise factual information on a specific subject, organized systematically for quick and

easy access. Synonymous with vade mecum. See also: companion and manual; vade mecum: A Latin phrase meaning "goes with me." A small book such as a guidebook, handbook, or manual meant to be carried about, used during the Middle Ages by physicians, astrologers, and tradesmen for quick reference and computation. In a more general sense, any item regularly carried by a person. Also spelled vade-mecum. Plural: vade mecums; companion: A handbook intended to be used in connection with the study of a particular subject or field (examples: The Cambridge Companion to Ralph Ellison and The Oxford Companion to Philosophy). This type of reference work is often an edited collection of essays; manual: A book of compact size, especially one describing in considerable detail the government of a state or the structure and functions of a government agency (example: The United States Government Manual published annually by the U.S. Government Printing Office). Also refers to a book or pamphlet containing practical instructions, rules, or steps for performing a task or operation, assembling a manufactured object, or using a system or piece of equipment (example: Manual of Archival Description published by Gower). Used synonymously with handbook)

670 __ |**a** Wikipedia, July 30, 2014 |**b** (Enchiridion is a Late Latin term referring to a small manual or handbook; enchiridions)

670 __ |**a** Merriam-Webster online, July 30, 2014 |**b** (enchiridion, plural enchiridia: handbook, manual)

670 __ |**a** Wiktionary, July 30, 2014 |**b** (enchiridion (plural enchiridions or enchiridia): A handbook or manual; handbook (plural handbooks): A topically organized book of reference on a certain field of knowledge, disregarding the size of it; manual (plural manuals) 1. A handbook)

985 __ |**a** MvI

985 __ |**e** General terms project

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Attachment 3E

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450 __ |**a** Photovoltaics

550 __ |**w** g |**a** Direct energy conversion

550 __ |**w** g |**a** Solar energy

550 __ |**a** Solar batteries

670 __ |**a** Applied photovoltaics, 2007: |**b** p. 1 (photovoltaics, the process of converting sunlight directly into electricity using solar cells) p. 4 of cover (science, principles, and practice of photovoltaic energy conversion)

670 __ |**a** Wikipedia, May 21, 2007 |**b** (Photovoltaics, or PV for short, is a technology in which light is converted into electrical power. It is best known as a method for generating solar power by using solar cells or solar photovoltaic arrays to convert energy from the sun into electricity)

906 __ |**t** 0723 |**u** te04 |**v** 0

953 __ |**a** xx00 |**b** ym20

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MARC Bibliographic Record

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711 2_ $aWorld Conference on Photovoltaic Energy Conversion.

906 $aCONFERENCE

920 $aexl_impl conversion

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710 2 Institute of Electrical and Electronics Engineers.

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245 1 0 1994 IEEE First World Conference on Photovoltaic Energy Conversion, conference re cord of the Twenty Fourth IEEE Photovoltaic Specialists Conference - 1994 : **$b** Hilto n Waikoloa Village, Waikoloa, Hawaii, December 5-9, 1994.

260 New York, N.Y. : **$b** IEEE, **$c** 1994.

300 2 volumes : **$b** illustrations ; **$c** 29 cm

336 text **$b** txt **$2** rdacontent

337 unmediated **$b** n **$2** rdamedia

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530 Also available via the World Wide Web with additional title: Photovoltaic Energy Con version, 1994, conference record of the Twenty Fourth, IEEE Photovoltaic Specialists Conference - 1994, 1994 IEEE First World Conference on.

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856 4 1 **$3** IEEE Xplore **$u** http://ieeexplore.ieee.org/servlet/opac?punumber=3971