UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY LIMITED
Petitioner

v.

ALIDOUBLE, INC.
Patent Owner

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Inter Partes Review of U.S. Patent No. 6,169,319

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DECLARATION OF SYLVIA D. HALL-ELLIS, PH.D.

I. INTRODUCTION

1. My name is Sylvia D. Hall-Ellis. I have been retained as an expert by Petitioner.

2. I have written this declaration at the request of Petitioner 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 bases for my opinions regarding the public availability of these publications.

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

4. I am being compensated for my time spent working on this matter at my normal consulting rate of $325 per hour, plus reimbursement for any additional reasonable expenses. My compensation is not in any way tied to the content of this Declaration, the substance of my opinions, or the outcome of this dispute. 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 Declaration.

II. QUALIFICATIONS

6. 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.

7. 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 founding 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 Founding 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, a member of the REFORMA National Board of Directors, a member of the Editorial Board for the ALCTS premier cataloging journal, *Library Resources and Technical Services*, and as a Co-Chair for the

Membership Committee of the Library Research Round Table (LRRT) of the American Library Association. Currently I serve as a member of the LRRT Nominating Committee.

8. 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.

9. I have been deposed twenty-six times: (1) *Symantec Corp. v. Finjan, Inc.,* Petition for *Inter Partes Review* of U.S. Patent No. 7,613,926, IPR 2015-01892, May 26, 2016, on behalf of Symantec Corp.; (2) *Symantec Corp. v. Finjan, Inc.,* 14-cv-299-HSG (N.D. Cal.), on behalf of Symantec Corp., September 14, 2017; (3) one deposition for ten matters: *Intellectual Ventures I LLC v. 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 v. 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 v. T-Mobile USA, Inc. and T-Mobile US, Inc.,* C.A. No. 13-1632 (LPS); *Intellectual Ventures II LLC v. T-Mobile USA, Inc.*

and T-Mobile US, Inc., C.A. No. 13-1633 (LPS); *Intellectual Ventures I LLC, v. 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 v. 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, v. United States Cellular Corporation*, C.A. No. 13-1636 (LPS); *Intellectual Ventures I LLC v. United States Cellular Corporation*, C.A. No. 13-1637 (LPS); *Intellectual Ventures II LLC v. AT&T Mobility LLC*, *AT&T Mobility II LLC, New Cingular Wireless Services, Inc.,* C.A. No. 15-799 (LPS); *Intellectual Ventures I LLC v. 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.,* 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. v. General Access Solutions, Ltd*., Petition for *Inter Partes Review* of U.S. Patent No. 7,173,916, IPR 2017-01885, on behalf of Sprint Spectrum L.P.,

July 13, 2018; (6) *Nichia Corporation v. Vizio, Inc*., 8:16-cv-00545; on behalf of Vizio, Inc., October 12, 2018; (7) *Intellectual Ventures I LLC, v. T-Mobile USA, Inc., T-Mobile US, Inc., Ericsson Inc., and Telefonaktiebolaget LM Ericsson,* 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. v. Biogen, Inc.,* Petition for *Inter Partes Review* of U.S. Patent No. 8,821,873, IPR 2017-01168, on behalf of Pfizer, November 3, 2018; (9) *Finjan, Inc. v. ESET, LLC and ESET SPOL. S.R.O.,* 3:17-cv-00183-CAB-BGS, on behalf of ESET, January 15, 2019; (10) *Finjan, Inc. v. Cisco Systems, Inc.,* 5:17-cv-00072-BLF-SVK, on behalf of Cisco Systems, Inc., September 6, 2019; (11) *Facebook, Inc., Instagram, LLC and Whatsapp Inc. v. Blackberry Limited* 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 3Shape Inc. v. Align Technology, Inc.,* Petition for *Inter Partes Review* of U.S. Patent No. 7,156,661, IPR 2020-00222 and IPR 2020-00223, 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, on behalf of Rapid7 Inc. and Rapid7 LLC; (14) *VLSI Technology LLC v. Intel Corporation*, Western District of Texas, 6:19-cv-00254, 6:19-

cv-00255, 6:19-cv-00256, September 23, 2020, on behalf of the Intel Corporation; (15) *Finjan Inc. v. Sonicwall, Inc.,* Northern District of California, 5:17-cv-04467-BLF-HRL, October 27, 2020, on behalf of Sonicwall, Inc.; (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. 3BCOM, LLC*, Petition for *Inter Partes Review* of U. S. Patent 7,127,210, 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; and, (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.; and, (26) *ParkerVision, Inc. v. Intel Corporation*, Western District of Texas, 6:20-cv-108 (ADA), October 26, 2022, on behalf of the Intel Corporation.

10. My full *curriculum vitae* is attached hereto as Appendix A.

III. PRELIMINARIES

A. Scope of This Declaration

11. 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 them at the time of their publication.

12. 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.

13. 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.

14. 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. That is, I understand that cataloging and indexing by a library is sufficient, although 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.

15. 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. I also understand that the indicia on the face of a reference, such as printed dates and stamps, are considered as part of the totality of the evidence.

B. Persons of Ordinary Skill in the Art

16. I am told by counsel that the subject matter of this proceeding relates generally to complementary metal-oxide semiconductor (CMOS) image sensors.

17. 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.

18. I am told by counsel that persons of ordinary skill in this subject matter or art would have had the equivalent of a Master's degree in electrical engineering, computer engineering, or physics with at least two years of industry experience in integrated circuit design, layout, packaging or fabrication. A greater level of experience may compensate for less education, and vice versa.

19. 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, 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.

C. Authoritative Databases

20. In preparing this report, I used authoritative databases, such as the OCLC WorldCat, the Library of Congress Online Catalog, *IEEE Xplore* database, the digital repositories *ResearchGate* and *Semantic Scholar*, and the U. S.

Copyright Office database, to confirm citation details of the various publications discussed.

21. *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.

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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/

22. *IEEE Xplore*.[3] Librarians in academic, special, and large public libraries are familiar with the *IEEE Xplore* database. In working with undergraduate and graduate students, researchers, scientists, and the public, librarians are intimately familiar with the *IEEE Xplore* database and rely on its content for access to reliable, accurate publications. Established to serve as a 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 5.7 million documents which is known for its reputable curation and maintenance of documents and publication information. The *IEEE Xplore* 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 to access, but access to full text requires a subscription or institutional login.

23. 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

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

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 5.5-million full-text documents from some of the world's most 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.

24. *ResearchGate*.[4] A European-based social networking site 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, although other services have more registered users. 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 to connect with others who have similar interests. Member questions are fielded to others who have identified relevant expertise on their profiles.

25. As of 2021, *ResearchGate* had more than 20 million scientists, with its largest user-bases coming from Europe and North America. Most of *ResearchGate's* users are involved in medicine, biology, engineering, computer science, agricultural sciences, and psychology.

26. *Semantic Scholar*.[5] 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.

27. 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 Alexa platform, was hired to lead the *Semantic Scholar* project. As of August

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[4] https://www.researchgate.net/

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

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.

28. *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.[6] Individuals can search by title, personal or corporate name, key word, registration number, and document number. Works filed before 1978 can be located through the Copyright Public Records Reading Room.[7] A researcher can find the date on which an item was published and deposited for copyright.

D. Indexing

29. 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,

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

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

or purchase it from the 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.

30. 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.

31. 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 the bibliography and resources in academic disciplines.

32. 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.

33. 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. Machine-Readable Cataloging (MARC) Standard

34. 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.[8] 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

[8] 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.[9]

35. 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.[10] 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

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[9] 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 October 29, 2022) ("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 fifty 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.

[10] 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 October 29, 2022).

> 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 industry-wide standard whose primary purpose is to foster communication of information.
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> 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 October 29, 2022).

36. Thus, 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 October 29, 2022) ("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 fifty 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 standard (reaffirmed in 2016) for Information Interchange Format. The full text of the standard is available from the Library of Congress.[11]

37. 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.*[12] If a work is a periodical, then its publication frequency is recorded in field

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[11] http://www.loc.gov/marc/bibliographic/

[12] 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 October 29, 2022) ("Information in field 264 is similar to information in field 260 (Publication, Distribution, etc. (Imprint)). Field 264 is useful for cases

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.[13]

38. 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 website.[14] For example, 6XX fields are termed "Subject Access Fields."[15] Among these, for example, is the 650 field; this is the "Subject Added Entry – Topical Term" field.[16] The 650 field is a "[s]ubject added entry in which the entry element is a topical term."[17] 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))."[18]

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where the content standard or institutional policies make a distinction between functions").

[13] http://www.loc.gov/marc/bibliographic/bd3xx.html

[14] http://www.loc.gov/marc/bibliographic/

[15] http://www.loc.gov/marc/bibliographic/bd6xx.html

[16] http://www.loc.gov/marc/bibliographic/bd650.html

[17] *Id*.

[18] *Id*.

39. 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."[19] 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*."[20] 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.

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[19] http://www.loc.gov/marc/bibliographic/bd050.html

[20] *Id*.

40. 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.[21]

41. OCLC 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 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

[21] http://www.loc.gov/marc/bibliographic/bd09x.html

library with access to the OCLC bibliographic database or through the Library of Congress.

42. 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, or shortly after 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, but when a MARC record is printed to hardcopy, no "005" label appears. The initial field 005 date (*i.e.*, the date the MARC record was created) does appear, however, next to the label "Entered."[22] The date upon which the most recent update to field 005

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[22] In this report, I sometimes refer to the "Entered" entry as field 008, characters 00-05. Field 005 is visible when viewing a MARC record via an appropriate

occurred also appears, next to the label "Replaced." 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 the label "Entered" is necessarily on or after the date the library first cataloged and indexed the underlying item.

43. 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.

44. 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

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computerized interface. But when a MARC record is printed directly to hardcopy from the OCLC database, the "005" label is not shown. The date in the 005 field instead appears next to the label "Replaced."

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.

45. ***Journals.*** In addition to creating records for books, OCLC also hosts records for serial publications. Serial publications have the same collective title but are intended to continue indefinitely with enumeration such as a volume or issue number (*e.g.*, magazines, journals, etc.). In the OCLC bibliographic database, the first issue of the serial publication is typically cataloged, but the date is left open-ended with the use of a punctuation mark such as a dash. Individual issues are not cataloged according to the current national cataloging rules outlined in *RDA: Resource and Access*.

46. MARC records for serial publication in OCLC represent the entire run of the serial title. With knowledge of the first issue published, future issues can be

predicted. In my extensive professional experience, is it highly unusual for a library to stop collecting and shelving a serial publication prior to the end of its publication run. If a subscription to a serial publication ends its run or is cancelled before the end of its run, the library will denote that it has stopped receiving new volumes by filling in the end date in the local MARC record.

47. The handling of printed journal subscriptions is shown on the cover or the first few pages of individual issues. As was the best practice among libraries, issues arrived at a central facility and were immediately received, verified as part of a subscription, checked in, and stamped or labeled with the institution's name and date. Determining that the issue was part of the library subscription ensured that the entire set of publications for the year had been received so that they could be professionally bound and retained. This process also verified that all of the published issues arrived so that the library staff did not have to request or claim an issue that did not arrive as expected. In large public libraries with branches and multi-campus libraries within academic institutions, the journals were sorted and delivered to the subscribing unit. The new issue was placed in the public area; the older issue was stored so that it remained available.

48. The foregoing process has been standard library practice longer than I have been working in the profession. I first learned the steps in the process in the

late 1970s and later supervised it. Although the checking in process has become automated and now links electronically to holdings records for the MARC record for each serial title, the manual placement of a stamp or label and placing the issue in a public area has not changed for 50 years. Unless I note otherwise below in reference to a specific serial publication, it is my expert opinion that this standard protocol was followed for the serial publications discussed below.

V. PUBLICATIONS

A. Badihi conference paper [Exhibit 1101]

49. Attached hereto is Exhibit 1101, which I understand is being submitted along with my declaration, is a copy of a conference paper published in the *Proceedings International Symposium on Advanced Packaging Materials. Processes, Properties and Interfaces* found in the Kurt F. Wendt Engineering Library at the University of Wisconsin – Madison. The conference paper titled "Shellcase Ultrathin Chip Size Package" by A. Badihi (hereafter "Badihi") appears beginning on page 236. The 5th International Symposium on Advanced Packaging Materials was held on March 14-17, 1999, in Braselton, Georgia. Exhibit 1101 is a true and correct copy of the Badihi conference paper (pages 236-240). I obtained this copy of the conference paper in the Kurt F. Wendt Engineering Library at the University of Wisconsin – Madison. Specifically, the text of the Bahidi 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 1101 was found within the custody of a library – a place where, if authentic, a copy of this conference proceedings volume would likely be. Exhibit 1101 is a true and correct copy in a condition that creates no suspicion about authenticity. It is my opinion, based on the sources from which I obtained this reference, and that they are known to be reputable and well-known sources, that the copy I obtained is an authentic copy of this article as it was published in 1999. It is well-accepted practice to consider the publication dates on papers retrieved from these sources as the dates on which they were publicly available and accessible.

50. The Badihi conference paper is also available in *IEEE Xplore*[23] by logging into the database through an institutional or personal account and downloading the conference paper or purchasing a copy from IEEE. An information seeker can also locate the Bahidi conference paper in the digital repository *Semantic Scholar,*[24] which links to *IEEE Xplore*.

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[23] https://ieeexplore.ieee.org/document/757319

[24] https://www.semanticscholar.org/paper/ShellCase-ultrathin-chip-size-package-Badihi/896d26be6215e57c674479775b22675b0fe5cc8e

51. Attached hereto as Attachment 1a is a true and correct copy of the MARC record for this conference proceedings volume from the Kurt F. Wendt Engineering Library at the University of Wisconsin – Madison online catalog. The library ownership is indicated by the presence of the library's code (GZM) in the 049 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 23, 2018, as shown in field 005 ("20180323"). I personally identified and retrieved the library catalog record which is Attachment 1a.

52. Based on finding a print copy of Exhibit 1101 in the Kurt F. Wendt Engineering Library at the University of Wisconsin – Madison and MARC record in its online library catalog attached as Attachment 1a, it is my opinion that the book *Proceedings International Symposium on Advanced Packaging Materials. Processes, Properties and Interfaces* was publicly available in the Kurt F. Wendt Engineering Library at the University of Wisconsin – Madison as of March 30, 1999, as shown in field 008 ("990330").

53. Attached hereto as Attachment 1b is a true and correct copy of the MARC record for the *Proceedings International Symposium on Advanced Packaging Materials. Processes, Properties and Interfaces* 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 "DLC," which means that the MARC record for this conference proceedings volume was cataloged at the Library of Congress. As can be seen in the "Entered" field in the MARC record for this exhibit, a cataloger at the Library of Congress created OCLC record number 41066168 on March 30, 1999, as shown in the "Entered" field ("19990330"). The library continues to update this MARC record the MARC record to meet current cataloging rules. The most recent enhancement to the MARC record occurred on April 5, 2022, as shown in the "Replaced" field ("20220405").

54. Attachment 1b further includes an entry in field 050 ("TK7870.15 $b .I586 1999")—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 ("621.381/046")—as described above, a subject matter classification number consistent with the Dewey Decimal classification system. Attachment 1b also shows that the volume was catalogued with a descriptor term reading "Electronic packaging $x Materials $v Congresses" (see Attachment 1c, Library of Congress subject heading

sh2008119322) 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. Further, as of March 30, 1999, the MARC record attached hereto as Attachment 1b was accessible through any library with access to the OCLC bibliographic database or the online catalog at a library that acquired the conference proceedings volume, 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.

55. Further supporting my opinion that Exhibit 1101 was publicly accessible to ordinarily skilled and interested researchers in the field is the fact that the book *Proceedings International Symposium on Advanced Packaging Materials. Processes, Properties and Interfaces* was registered with the U. S. Copyright Office as item TX0004966674 on March 23, 1999, and indicated a publication date of March 14, 1999 (see Attachment 1d, U. S. Copyright Office Public Catalog). As noted above, this would have provided a person interested in the relevant subject matter with keyword searching capabilities and other tools to locate this book.

56. Attachment 1b indicates that the volume *Proceedings International Symposium on Advanced Packaging Materials. Processes, Properties and Interfaces* as cataloged at the Library of Congress is currently available from 26 libraries. In view of the above, the volume *Proceedings International Symposium on Advanced Packaging Materials. Processes, Properties and Interfaces* was publicly available on or shortly after March 30, 1999, because by that date it had been received, cataloged, and indexed at the Library of Congress, made part of the OCLC bibliographic database, and received in the Kurt F. Wendt Engineering Library at the University of Wisconsin – Madison. For these reasons, it is my opinion that Exhibit 1101 was published and publicly accessible on or shortly after March 30, 1999.

B. Ballin journal article [Exhibit 1102]

57. Exhibit 1102 is a copy of Volume 8, Number 9 of the online open access journal *Sensors* found in the National Library of Medicine (Bethesda, Maryland). The article "Monolithic Active Pixel Sensors (MAPS) in a Quadruple Well Technology for Nearly 100% Fill Factor and Full CMOS Pixels" by Jamie Alexander Ballin, Jamie Phillip Crooks, Paul Dominic Dauncey, Anne-Marie Magnan, Yoshinari Mikami, Owen Daniel Miller, Matthew Noy, Vladimir Rajovic, Marcel Stanitzki, Konstantin Stefanov, Renato Turchetta, Mike Tyndel,

Enrico Giulio Villani, Nigel Keith Watson, and John Allan Wilson (hereafter "Ballin") appears beginning on page 5336 of this issue dated September 2008. Exhibit 1102 is a true and correct copy of the Ballin article that I understand is being submitted as an exhibit in this proceeding. Exhibit 1102 is a true and correct copy of the Ballin article (pages 5336-5351). I obtained this copy of the article through the National Library of Medicine. Specifically, the text of the article 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 1102 was found within the custody of a library – a place where, if authentic, a copy of this online open access journal would likely be. Exhibit 1102 are true and correct copies in a condition that creates no suspicion about their authenticity. It is my opinion, based on the sources from which I obtained this reference, and that they are known to be reputable and well-known sources, that the copy I obtained is an authentic copy of this article as it was published in 2008. It is well-accepted practice to consider the publication dates on papers retrieved from these sources as the dates on which they were publicly available and accessible.

58. The Ballin conference paper is also available from the publisher's

website[25] as well as from the National Library of Medicine[26] by logging into the LocatorPlus online catalog, retrieving the entry for the journal, and selecting the "Directory of Open Access Journals" and then the volume and issue, and downloading the Ballin article. An information seeker can also locate the Ballin conference paper by downloading it from the digital repository *ResearchGate*[27] or *Semantic Scholar,*[28] which links to the publisher's website and PubMed at the National Library of Medicine. The publisher's website indicates a September 2, 2008, publication date.

59. Attached hereto as Attachment 2a is a true and correct copy of the MARC record for the journal *Sensors* at the National Library of Medicine. The library ownership is indicated by the presence of the library's code (DNLM) in the 935 field. I personally identified and retrieved the MARC record that is

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[25] https://www.mdpi.com/1424-8220/8/9/5336

[26] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3705507/

[27] https://www.researchgate.net/publication/26548048_Monolithic_Active_Pixel_Sensors_MAPS_in_a_Quadruple_Well_Technology_for_Nearly_100_Fill_Factor_and_Full_CMOS_Pixels

[28] https://www.semanticscholar.org/paper/Monolithic-Active-Pixel-Sensors-(MAPS)-in-a-Well-Ballin-Crooks/67e14dcc37ea00a6306c2d2ef07e7f6f6f428ad7

Attachment 2a. Attachment 2a also shows that Exhibit 1102 was catalogued with a descriptor term reading "Biosensing Techniques $v Periodical" (see Attachment 2b, National Library of Medicine D015374) in the 650 field.

60. Based on finding a copy of Exhibit 1102 in the National Library of Medicine and MARC record in its online library catalog attached as Attachment 2a, it is my opinion that the Ballin article published in the online open access journal *Sensor* was available at the National Library of Medicine on September 2, 2008.

61. As noted in the holdings information (field 362), the National Library of Medicine has received the online open access journal *Sensors* since June 2001 and continues to receive the publication. In view of the MARC record for Exhibit 1102, the Ballin article was publicly available on September 2, 2008, because the serial title had been cataloged and indexed at the National Library of Medicine and made part of its online catalog database.

62. Attached hereto as Attachment 2c is a true and correct copy of the MARC record for the online open access journal *Sensors* obtained from the OCLC bibliographic database. I personally identified and retrieved the MARC record that is Attachment 2c. As previously noted, the library that created the record is recorded in field 040 with a unique library code. For Attachment 2c, that library

code is "CUS," which means that the MARC record for this serial was cataloged at the University of California – San Diego Libraries. As can be seen in the "Entered" field in the MARC record for this exhibit, a cataloger at the University of California – San Diego Libraries created OCLC record number 47250782 on July 6, 2001. The "BLvl" entry in Attachment 2c is "s," which indicates that the online open access journal *Sensors* is a serial publication. Field 310 of Attachment 2c reads "Monthly." Accordingly, the MARC record for Exhibit 1102 corresponds to those issues of the online open access journal *Sensors* from the time of the serial began publication to the present day.

63. Attachment 2c further includes an entry in field 050 ("TA165")—includes a subject matter classification number consistent with the Library of Congress classification system (analogous to the Dewey Decimal classification system). Attachment 2c further includes three descriptor terms reading "Detectors $v Periodicals" (see Attachment 2d, Library of Congress sh85037291 and Attachment 2e, Library of Congress subject heading sh85099890), "Biosensors systems $v Periodicals" (see Attachment 2f, Library of Congress subject heading sh85014260 and Attachment 2e, Library of Congress subject heading sh85099890), and "Chemical detectors $v Periodicals" (see Attachment 2g, Library of Congress subject heading sh85022895 and Attachment 2e, Library of

Congress subject heading sh85099890) in the 650 fields. Thus, as of its cataloging, the publication corresponding to the MARC record attached hereto as Attachment 2c was indexed according to its subject matter by virtue of at least two independently sufficient classifications: the field 050 entry the field 650 entries. Further, as of July 6, 2001, the MARC record attached hereto as Attachment 2c was accessible through any library with access to the OCLC bibliographic database or the online catalog at a library that subscribed to the serial, 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.

64. Attachment 2c indicates that the online open access journal *Sensors* as cataloged at the University of California – San Diego Libraries is currently available from 1,107 libraries. In view of the above, this issue of the online open access journal *Sensors* was publicly available on September 2, 2008, because by that date it had been cataloged and indexed at the University of California – San Diego Libraries, made part of the OCLC bibliographic database, and received at the National Library of Medicine. For these reasons, it is my opinion that Exhibit 1102 was published and accessible to the public on September 2, 2008.

C. Sakai journal article [Exhibit 1103]

65. Exhibit 1103 is a copy of Volume 12, Number 3 of *The Journal of the Japan Institute for Interconnecting and Packaging Electronic Circuits* found in the British Library. The article "CSP Development of ShellCase Type" by Hisayuki Sakai (hereafter "Sakai") appears beginning on page 144 of this issue dated May 1997. Exhibit 1103 is a true and correct copy of the Sakai article that I understand is being submitted as an exhibit in this proceeding. Exhibit 1103 is a true and correct copy of the Sakai article (pages 144-147). I obtained this copy of the article from the British Library. Specifically, the text of the article 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 1103 was found within the custody of a library – a place where, if authentic, a copy of this journal would likely be. Exhibit 1103 are true and correct copies in a condition that creates no suspicion about their authenticity. It is my opinion, based on the sources from which I obtained this reference, and that they are known to be reputable and well-known sources, that the copy I obtained is an authentic copy of this article as it was published in 1997. It is well-accepted practice to consider the publication dates on papers retrieved from these sources as the dates on which they were publicly available and accessible.

66. The Sakai conference paper is available from the publisher's website.[29] The publisher's website indicates a May 20, 1997, publication date.

67. Attached hereto as Attachment 3a is a true and correct copy of the MARC record for *The Journal of the Japan Institute for Interconnecting and Packaging Electronic Circuits* at the British Library. The library ownership is indicated by the presence of the library's name in the 852 field. I personally identified and retrieved the MARC record that is Attachment 3a.

68. Based on finding a copy of Exhibit 1103 in the British Library and MARC record in its online library catalog attached as Attachment 3a, it is my opinion that the Sakai article published in *The Journal of the Japan Institute for Interconnecting and Packaging Electronic Circuits* was available at the British Library on or shortly after May 28, 1997, as shown on the cover.

69. The cover of the May 197 issue of *The Journal of the Japan Institute for Interconnecting and Packaging Electronic Circuits* has a label affixed by or on behalf of the British Library which shows that it was received, verified, and checked in on May 28, 1997. Therefore, in my experience, this issue of *The Journal of the Japan Institute for Interconnecting and Packaging Electronic Circuits* would have been available to users at the British Library on or shortly

[29] https://www.jstage.jst.go.jp/article/jiep1995/12/3/12_3_144/_article/-char/en

after that date.

70. As noted in the holdings information (field 362), the British Library has received *The Journal of the Japan Institute for Interconnecting and Packaging Electronic Circuits* since 1998 and continues to receive the publication. In view of the MARC record for Exhibit 1103, the Sakai article was publicly available on or shortly after May 28, 1997, because the serial title had been cataloged and indexed at the British Library and made part of its online catalog database.

71. Attached hereto as Attachment 3b is a true and correct copy of the MARC record for *The Journal of the Japan Institute for Interconnecting and Packaging Electronic Circuits* 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 "VT2," which means that the MARC record for this serial was cataloged at the University of Victoria Libraries (Victoria, British Columbia, Canada). As can be seen in the "Entered" field in the MARC record for this exhibit, a cataloger at the University of Victoria Libraries created OCLC record number 964877858 on August 21, 2012. The "BLvl" entry in Attachment 3b is "s," which indicates that *The Journal of the Japan Institute for Interconnecting and Packaging Electronic Circuits* is a serial

publication. Field 310 of Attachment 3a reads "Monthly." Accordingly, the MARC record for Exhibit 1103 corresponds to those issues of *The Journal of the Japan Institute for Interconnecting and Packaging Electronic Circuits* from the time of the serial began publication to the present day.

72. Further, as of August 21, 2012, 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 subscribed to the serial, 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.

73. Attachment 3b indicates that *The Journal of the Japan Institute for Interconnecting and Packaging Electronic Circuits* as cataloged at the University of Victoria Libraries is currently available from 46 libraries. In view of the above, this issue of *The Journal of the Japan Institute for Interconnecting and Packaging Electronic Circuits* was publicly available on May 28, 1997, because by that date it had been received, cataloged, and indexed at the British Library. For these reasons, it is my opinion that Exhibit 1103 was published and accessible to the public on May 28, 1997.

D. Zucca conference paper [Exhibit 1104]

74. Attached hereto is Exhibit 1104, which I understand is being submitted along with my declaration, is a copy of a conference paper published in the volume titled *2012 IEEE Nuclear Science Symposium and Medical Imaging Conference Record* found in the Kurt F. Wendt Engineering Library at the University of Wisconsin – Madison. The conference paper titled "Monolithic Pixel Sensors for Fast Particle Trackers in a Quadruple Well CMOS Technology" by Stefano Zucca, Luigi Gaioni, Lodovico Ratti, Gianluca Traversi, Stefano Bettarini, Fabio Morsani, Giuliana Rizzo, Alessandro Gabrielli, and Filippo Giorgi (hereafter "Zucca") appears beginning on page 1742. The 2012 IEEE Nuclear Science Symposium and Medical Imaging Conference was held on October 27 – November 3, 2012, in Anaheim, California. Exhibit 1104 is a true and correct copy of the Zucca conference paper (pages 1742-1749). I obtained this copy of the conference paper in the Kurt F. Wendt Engineering Library at the University of Wisconsin – Madison. Specifically, the text of the Zucca 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 1104 was found within the custody of a library – a place where, if authentic, a copy of this conference proceedings volume would likely be. Exhibit 1104 is a true and

correct copy in a condition that creates no suspicion about authenticity. It is my opinion, based on the sources from which I obtained this reference, and that they are known to be reputable and well-known sources, that the copy I obtained is an authentic copy of this article as it was published in 2012. It is well-accepted practice to consider the publication dates on papers retrieved from these sources as the dates on which they were publicly available and accessible.

75. The Zucca conference paper is also available in *IEEE Xplore*[30] by logging into the database through an institutional or personal account and downloading the conference paper or purchasing a copy from IEEE. The Zucca conference paper was added to the *IEEE Xplore* database on July 8, 2013. An information seeker can also locate the Zucca conference paper in the digital repository *ResearchGate,*[31] by requesting a copy of the conference paper from the authors.

76. Attached hereto as Attachment 4a is a true and correct copy of the MARC record for this conference proceedings volume from the Kurt F. Wendt

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[30] https://ieeexplore.ieee.org/document/6551408

[31] https://www.researchgate.net/publication/271496886_Monolithic_pixel_sensors_for_fast_particle_trackers_in_a_quadruple_well_CMOS_technology

Engineering Library at the University of Wisconsin – Madison online catalog. The library ownership is indicated by the presence of the library's name at the top of the screen. 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 August 7, 2021, as shown in field 005 ("20210807"). I personally identified and retrieved the library catalog record which is Attachment 4a.

77. Based on finding a print copy of Exhibit 1104 in the Kurt F. Wendt Engineering Library at the University of Wisconsin – Madison and MARC record in its online library catalog attached as Attachment 4a, it is my opinion that the book titled *2012 IEEE Nuclear Science Symposium and Medical Imaging Conference Record* was publicly available in the Kurt F. Wendt Engineering Library at the University of Wisconsin – Madison as of August 29, 2016, as shown in field 008 ("160829").

78. Attached hereto as Attachment 4b is a true and correct copy of the MARC record for the ebook volume titled *2012 IEEE Nuclear Science Symposium and Medical Imaging Conference Record* 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 "COO," which means that the MARC record for this conference proceedings volume was cataloged in the Mann Library at Cornell University (Ithaca, New York). As can be seen in the "Entered" field in the MARC record for this exhibit, a cataloger in the Mann Library at Cornell University created OCLC record number 861073879 on April 12, 2012, as shown in the "Entered" field ("20120412"). The library continues to update this MARC record the MARC record to meet current cataloging rules. The most recent enhancement to the MARC record occurred on May 14, 2022, as shown in the "Replaced" field ("20220514").

79. Attachment 4b further includes an entry in field 050 ("QC770 $b .N788 2012")—as described above, a subject matter classification number consistent with the Library of Congress classification system (analogous to the Dewey Decimal classification system). Attachment 4b also shows that the volume was catalogued with five descriptor terms reading "Semiconductor nuclear counters $v Congresses" (see Attachment 4c, Library of Congress subject heading sh85119898 and Attachment 4d, Library of Congress subject heading sh85031115), "Imaging systems in medicine $v Congresses" (see Attachment 4e, Library of Congress subject heading sh2008104262), "Nuclear energy $x Research $v Congresses" (see Attachment 4f, Library of Congress subject heading

sh85092964 and Attachment 4d, Library of Congress subject heading sh85031115), "Nuclear physics $x Research $v Congresses" (see Attachment 4g, Library of Congress subject heading sh85093027 and Attachment 4d, Library of Congress subject heading sh85031115), and "Nuclear physics $v Congresses" (see Attachment 1c, Library of Congress subject heading sh2008108473) 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 two independently sufficient classifications: the field 050 entry and the field 650 entries. Further, as of April 12, 2012, the MARC record attached hereto as Attachment 4b was accessible through any library with access to the OCLC bibliographic database or the online catalog at a library that acquired the ebook conference proceedings volume, 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.

80. Further supporting my opinion that Exhibit 1104 was publicly accessible to ordinarily skilled and interested researchers in the field is the fact that the book titled *2012 IEEE Nuclear Science Symposium and Medical Imaging Conference Record* was registered with the U. S. Copyright Office as item TX0007744693 on June 26, 2013 and indicated a publication date of June 26, 2013

(see Attachment 4i, U. S. Copyright Office Public Catalog). As noted above, this would have provided a person interested in the relevant subject matter with keyword searching capabilities and other tools to locate this book.

81. Attachment 1b indicates that the ebook volume titled *2012 IEEE Nuclear Science Symposium and Medical Imaging Conference Record* as cataloged in the Mann Library at Cornell University is currently available from 267 libraries. In view of the above, the ebook volume titled *2012 IEEE Nuclear Science Symposium and Medical Imaging Conference Record* was publicly available on or shortly after April 12, 2012, because by that date it had been received, cataloged, and indexed in the Mann Library at Cornell University and made part of the OCLC bibliographic database. For these reasons, it is my opinion that Exhibit 1104 was published and publicly accessible on or shortly after April 12, 2012.

VI. SUMMARY OF OPINIONS

82. In view of the foregoing, it is my opinion that the publications described above were publicly available no later than the corresponding date listed in the table below:

Doc.	Publication	Publicly Available No Later Than
Exhibit 1101	Badihi, A. "Shellcase Ultrathin Chip Size Package." *Proceedings International Symposium on Advanced Packaging Materials. Processes, Properties and Interfaces* (pp. 236-240). Piscataway, NJ: IEEE, 1999.	March 30, 1999
Exhibit 1102	Ballin, Jamie Alexander, Jamie Phillip Crooks, Paul Dominic Dauncey, Anne-Marie Magnan, Yoshinari Mikami, Owen Daniel Miller, Matthew Noy, Vladimir Rajovic, Marcel Stanitzki, Konstantin Stefanov, Renato Turchetta, Mike Tyndel, Enrico Giulio Villani, Nigel Keith Watson, and John Allan Wilson. "Monolithic Active Pixel Sensors (MAPS) in a Quadruple Well Technology for Nearly 100% Fill Factor and Full CMOS Pixels." *Sensors*, vol. 8, no. 9 (2008): 5336-5351.	September 2, 2008
Exhibit 1103	Sakai, Hisayuki. "CSP Development of ShellCase Type." *The Journal of the Japan Institute for Interconnecting and Packaging Electronic Circuits,* vol. 12, no. 3 (May 1997): 144-147.	May 28, 1997
Exhibit 1104	Zucca, Stefano, Luigi Gaioni, Lodovico Ratti, Gianluca Traversi, Stefano Bettarini, Fabio Morsani, Giuliana Rizzo, Alessandro Gabrielli, and Filippo Giorgi. "Monolithic Pixel Sensors for Fast Particle Trackers in a Quadruple Well CMOS Technology." *2012 IEEE Nuclear Science Symposium and Medical Imaging Conference Record* (NSS/MIC) (pp. 1742-1749). Piscataway, NJ: IEEE, 2012.	May 12, 2012

83. In signing this Declaration, I recognize that the Declaration 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.

84. I hereby declare 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, or both, under Section 1001 of Title 18 of the United States Code.

December 14, 2022

Sylvia D. Hall-Ellis, Ph.D.

Attachment 1a
MARC record 2 UWI

MARC Bibliographic Record

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LEADER    01749mam a2200373 a 4500
001       9943370223602122
005       20180323021641.0
008       990330s1999 vaua b 101 0 eng d
020           $a0930815564 (softbound)
020           $a0780355083 (microfiche)
035           $a(OCoLC)41066168
035           $9AYA3811UW
035           $a(WU)4337022-uwmadisondb
035           $a(EXLNZ-01UWI_NETWORK)999854875902121
040           $aLHL$beng$cLHL$dGZM
049           $aGZMA
090           $aTK7870$b.I597 1999
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111 2_ $aInternational Symposium on Advanced Packaging Materials$n(5th :$d1999 :$cBraselton, Georgia)

245 10 $aInternational Symposium on Advanced Packaging Materials :$bprocesses, properties and interfaces : proceedings : Chateau Elan, Braselton, Georgia, March 14-17, 1999 /$cco-sponsored by International Microelectronics and Packaging Society (IMAPS) ... [and others] ; general chair, C.P. Wong ... [and others].

246 31 $aAdvanced packaging materials

264 _1 $aReston, Virginia :$bIMAPS ;$aPiscataway, New Jersey :$bIEEE,$c[1999]

300 $avii, 362 pages :$billustrations ;$c28 cm

336 $atext$btxt$2rdacontent

337 $aunmediated$bn$2rdamedia

338 $avolume$bnc$2rdacarrier

500 $a"... IEEE Catalog Number 99TH8405"--verso of T.p.

504 $aIncludes bibliographic references and author index.

530 $aAlso available in electronic format on the World Wide Web.

650 _0 $aElectronic packaging$xMaterials$vCongresses.

700 1_ $aWong, C. P.,$d1947-

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710    2_    $aInternational Microelectronics and Packaging Society.

710    2_    $aInstitute of Electrical and Electronics Engineers.

730    0_    $aIEEE Xplore conferences.

856    41    $zAvailable through IEEE Xplore$uhttp://ieeexplore.ieee.org/servlet/opac?punumber=6129

997          $aMARCIVE
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111 2 International Symposium on Advanced Packaging Materials $n (5th : $d 1999 : $c Braselton, Ga.)
245 10 International Symposium on Advanced Packaging Materials : $b processes, properties and interfaces : proceedings : Chateau Elan, Braselton, Georgia, March 14-17, 1999 / $c co-sponsored by International Microelectronics and Packaging Society (IMAPS) [and others] ; general chair, C.P. Wong [and others].
246 30 Advanced packaging materials
260 Reston, Va. : $b IMAPS ; $a Piscataway, N.J. : $b IEEE, $c [1999]
300 vii, 362 pages : $b illustrations ; $c 28 cm
336 text $b txt $2 rdacontent
337 unmediated $b n $2 rdamedia
338 volume $b nc $2 rdacarrier
500 " ... IEEE Catalog Number 99TH8405"--Title page verso.
504 Includes bibliographical references and index.
530 Also available via the World Wide Web with additional title: Advanced Packaging Materials: processes, properties and interfaces, 1999, proceedings, International Symposium on.
505 00 $t Conductive Adhesive Development Concept using a Bimodal Distribution of Ag-particles / $r Johan Liu, Z. H. Lai and L. L. Ye / $r [et al.] -- $t Conductivity Mechanisms of Isotropic Conductive Adhesives (ICAs) / $r Daoqiang Lu, C. P. Wong and Quinn K. Tong -- $t Development of Solderless Joining Technologies using Conductive Adhesives / $r H. Takezawa, M. Itagaki and T. Mitani / $r [et al.] -- $t Characterization of Silver Flakes Utilized for Isotropic Conductive Adhesives / $r Quinn Tong, Deanna L. Markley and Dorothy J. Magliocca / $r [et al.] -- $t Curing Kinetics Study for Designing of Novel Electronic Adhesives / $r Allison Y. Xiao and Solomon H. Jacobson -- $t Adhesion Enhancement of Underfill Materials by Silane Additives / $r Jianmin Qu, Qizhou Yao and Jaili Wu / $r [et al.] -- $t Investigation of Nonlinear Behaviors of Packaging Materials and its Application to a Flip-Chip Package / $r W. Ren, J.

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505 80 $t Recent Achievement in Microstructure Investigation of Sn0.5Cu3.4Ag Lead-free Alloy by adding Boron / $r Johan Liu, Z. H. Lai and L. L. Ye / $r [et al.] -- $t Smart Tooling for Assembly of Thin Flexible Systems / $r Ruijun Chen and Daniel Baldwin -- $t Oxidation Study of Cu Lead Frames / $r Ridha Berriche, R. Lowry and M. I. Rosenfield -- $t Electrically Isotropic Conductive Adhesives: An effective contact Resistance Model for Conductivity Development / $r Frank G. Shi, Midrajuddin Abdullah and Craig Davidson / $r [et al.] -- $t Novel Conductive Adhesives for Surface Mount Applications / $r Daoqiang Lu and C. P. Wong -- $t Effects of Shrinkage on Conductivity of Isotropic Conductive Adhesives / $r Daoqiang Lu and C. P. Wong -- $t Interface-Adhesion-Enhanced Bi-layer Conformal Coating for Avionics Application / $r Jiali Wu, Randy T. Pike and C. P. Wong -- $t Conductive Polymer Composites with Positive Temperature Coefficient / $r Shijian Luo and C. P. Wong -- $t Development and Characterization of Imidazole Derivative Cured Bisphenol a Epoxy Materials for Flip-Chip Underfill Applications / $r Songhua H. Shi, T. Yamashita and C. P. Wong -- $t Study on the Relationship between the Surface Composition of Copper Pads and No-Flow Underfill Fluxing Capability / $r Songhua H. Shi, D. Lu and C. P. Wong -- $t Effect of Thermal Residual Stresses on the Apparent Interfacial Toughness of Epoxy/Aluminum Interface / $r Jianmin Qu and Qizhou Yao -- $t Development of the Wafer Level Compressive-Flow Underfill Encapsulant / $r Songhua H. Shi, T. Yamashita and C. P. Wong -- $t Adhesion Studies of Model Epoxy Systems and Commercial Underfill Resins / $r Raymond A. Pearson and P. Komnopad -- $t Separation of Low Molecular Siloxanes for Electronic Application by Liquid-Liquid Extraction / $r C. P. Wong and Naoyuki Urasaki -- $t Epoxy-Additive Interaction Studies of Thermally Reworkable Underfills for Flip-Chip Applications / $r Lejun Wang and C. P. Wong.
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700 1 Wong, C. P., $d 1947-
710 2 International Microelectronics and Packaging Society.
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856 41 $3 IEEE Xplore $u http://ieeexplore.ieee.org/servlet/opac?punumber=6129

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Registration Number / Date: TX0004966674 / 1999-03-23
Application Title: 1999 5th International symposium on advanced packaging materials.
Title: International symposium on advanced packaging materials : processes, properties and interfaces : proceedings.
Description: 362 p.
Notes: Held Mar. 14-17, 1999, in Braselton, GA.
Copyright Claimant: Institute of Electrical and Electronics Engineers, Inc.
Date of Creation: 1999
Date of Publication: 1999-03-14
Variant title: International symposium on advanced packaging materials : processes, properties and interfaces
Other Title: 1999 5th International symposium on advanced packaging materials.
International symposium on advanced packaging materials, 5th, Braselton, GA, 1999
Names: Institute of Electrical and Electronics Engineers, Inc.

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510 0_ | ‡**a** PMC
538 __ | ‡**a** Mode of access: World Wide Web.
588 __ | ‡**a** Latest issue consulted: Vol. 11, issue 9 (Sept. 2011) (viewed Sept. 16, 2011).
650 12 | ‡**a** Biosensing Techniques
655 _2 | ‡**a** Periodical
710 2_ | ‡**a** Molecular Diversity Preservation International.
856 4_ | ‡**u** https://www.ncbi.nlm.nih.gov/pmc/journals/1660/
856 40 | ‡**u** http://www.mdpi.com/journal/sensors
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MESH

Biosensing Techniques MeSH Descriptor Data 2022

Details | Qualifiers | MeSH Tree Structures | Concepts

MeSH Heading
Biosensing Techniques
Tree Number(s)
E05.601.043
Unique ID
D015374
RDF Unique Identifier
http://id.nlm.nih.gov/mesh/D015374
Scope Note
Any of a variety of procedures which use biomolecular probes to measure the presence or concentration of biological molecules, biological structures, microorganisms, etc., by translating a biochemical interaction at the probe surface into a quantifiable physical signal.
Entry Term(s)
Bioprobes
Biosensing Technics
Biosensors
Electrodes, Enzyme
NLM Classification #
QT 36.4
Previous Indexing
Biosensors (1989-1998)
Biotechnology (1986-1988)
Electrodes (1980-1988)
Monitoring, Physiologic/instrumentation (1980-1988)
See Also
Microchemistry
Public MeSH Note
99; see BIOSENSORS 1989-98
History Note
99(89)
Date Established
1989/01/01
Date of Entry
1988/06/03
Revision Date
2015/06/22

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510 0 Chemical abstracts $x 0009-2258
530 Also issued on CD-ROM yearly.
538 Mode of access: World Wide Web.
588 Latest issue consulted: Volume 19, issue 2 (January (II),. 2019) (MDPI, viewed Feb. 4, 2019).
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360 __ |**i** subdivision |**a** Periodicals |**i** under specific subjects, e.g. |**a** Engineering--Periodicals; United States--History--Periodicals

450 __ |**a** Journals (Periodicals)

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550 __ |**a** Newspapers

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670 __ |**a** UMI business vocab. |**b** (Journals)

680 __ |**i** Here are entered works on the periodicals of the world and, with appropriate subdivisions, works on special aspects or sections of periodicals. Works on periodicals in a specific language, or in a specific country or larger area, are entered under the adjectival form of the language or area, e.g. |**a** Arabic periodicals; Canadian periodicals.

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450 __ |**a** Biodetectors
450 __ |**a** Biological detectors
450 __ |**a** Biological sensors
450 __ |**a** Biomedical detectors
450 __ |**a** Biomedical sensors
550 __ |**w** g |**a** Detectors
550 __ |**w** g |**a** Medical instruments and apparatus
550 __ |**w** g |**a** Physiological apparatus
670 __ |**a** Work cat.: Symposium on Biosensors (1984 : Los Angeles, Calif.). Proceedings of the symposium ... 1984.
670 __ |**a** McGrawHill dict. sci. tech.: |**b** p. 184 ("sensor used to provide information about a life process")
670 __ |**a** Chemical sensors VI, c2004: |**b** t.p. (biological sensors) table of contents (biosensors; biodetection methods)
906 __ |**t** 0511 |**u** te04 |**v** 0
953 __ |**a** ff02 |**b** yz00

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Attachment 2g
LCSH

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LC control no.: sh 85022895

LCCN Permalink: https://lccn.loc.gov/sh85022895

HEADING: Chemical detectors

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001 4675390

005 20120322080756.0

008 860211i| anannbabn |a ana

010 __ |**a** sh 85022895

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035 __ |**a** (DLC)22075

040 __ |**a** DLC |**c** DLC |**d** DLC

053 _0 |**a** TP159.C46

150 __ |**a** Chemical detectors

450 __ |**a** Chemical sensors

550 __ |**w** g |**a** Chemical apparatus

550 __ |**w** g |**a** Detectors

680 __ |**i** Here are entered works on apparatus used to detect the presence or absence of chemicals on a relatively gross scale in industrial processes, environmental protection, etc.

906 __ |**t** 9623 |**u** te07 |**v** 0

953 __ |**a** xx00 |**b** ta27

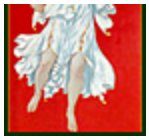
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310	|a Monthly
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337	|a unmediated |2 rdamedia
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595	|a FORMERLY 3700.274 CHANGE BETWEEN VOL. 9(7), 1994 AND 10(1), 1995 CONTD AS 4805.165 VOL. 1(1), 1998 SEE ALSO CARD INDEX.
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866 0	|a VOL. 10, 1995- 13(2), 1998
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OCLC 964877858 **No holdings in XXX - 46 other holdings**

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Desc	u	**SrTp**		**Cont**		**DtSt**	u	**Dates**	uuuu ,	uuuu	

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022 $y 1341-0571
090 $b
130 0 Journal of Japan Institute for Interconnecting and Packaging Electronic Circuits (Online)
245 10 Journal of Japan Institute for Interconnecting and Packaging Electronic Circuits.
260 [Place of publication not identified] : $b [publisher not identified]
336 text $b txt $2 rdacontent
337 computer $b c $2 rdamedia
338 online resource $b cr $2 rdacarrier
500 Title from content provider.
655 0 Electronic journals.
655 7 Periodicals. $2 fast $0 (OCoLC)fst01411641
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Attachment 4a
MARC record 8 UWI

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041         $aeng
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245    10   $a2012 IEEE Nuclear Science Symposium and Medical Imaging Conference
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OCLC 861073879 **No holdings in XXX - 267 other holdings**

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050 4 QC770 $b .N788 2012
088 CFP12NSS
090 $b
111 2 Nuclear Science Symposium $d (2012 : $c Anaheim, Calif.)
245 10 2012 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC) : $b October 29-November 3, 2012, Disneyland HOtel, Anaheim, California, USA / $c guest editor, Bo Yu.
246 1 $i Available from some providers with title: $a Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC), 2012 IEEE
246 3 NSS/MIC 2012
264 1 Piscataway, NJ : $b IEEE, $c [2012]
264 4 $c ©2012
300 1 online resource : $b illustrations
336 text $b txt $2 rdacontent
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500 IEEE Catalog Number CFP12NSS-ART.
504 Includes bibliographical references.
588 0 Online resource; title from PDF title page (IEEE Xplore, viewed Oct. 30, 2014).
650 0 Semiconductor nuclear counters $v Congresses.
650 0 Imaging systems in medicine $v Congresses.
650 0 Nuclear energy $x Research $v Congresses.
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700 1 Yu, Bo, $e editor.
710 2 Institute of Electrical and Electronics Engineers.
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667 __ |**a** Record generated for validation purposes.
670 __ |**a** Work cat.: 2002 IEEE International Symposium on Biomedical Imaging, c2002
906 __ |**t** 8888 |**u** te00 |**v** 0
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