UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

THE BOEING COMPANY
Petitioner,

v.

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
Patent Owner.

DECLARATION OF INGRID HSIEH-YEE, PH.D.
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 7,487,684

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I. Introduction

I, Ingrid Hsieh-Yee, Ph.D., do hereby declare as follows:

1. I have been retained as an independent expert on behalf of Boeing ("BOEING") for proceedings before the United States Patent and Trademark Office ("PTO") regarding the authenticity and public availability of a certain prior art references in relation to U.S. Patent No. 7,487,684.

2. I am being compensated for my work in this matter at my customary hourly rate. I am also being reimbursed for any reasonable expenses associated with my work and testimony in this investigation. My compensation is not contingent on the results of my study, the substance of my opinions, or the outcome of this matter.

A. Qualifications and Professional Experience

3. My complete qualifications and professional experience are described in my academic curriculum vitae (**Appendix A**). The following is a brief summary of my relevant qualifications and professional experience.

4. I was a professor in the Department of Library and Information Science at the Catholic University of America for 32 years and was conferred the title of Professor Emerita in December 2022. I have experience working in an academic library, a medical library, and a legislative library. I hold a Ph.D. and a Masters in Library and Information Studies from the University of Wisconsin-Madison.

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5. I am an expert on library cataloging and classification and have published two editions on this subject, *Organizing Audiovisual and Electronic Resources for Access*: *A Cataloging Guide* (2000 and 2006). I taught a variety of courses, including Cataloging and Classification, Advanced Cataloging and Classification, Organization of Internet Resources, Organization of Information, Metadata, Digital Content Creation and Management, Internet Searches and Web Design, Information Literacy Instruction, Advanced Information Retrieval and Analysis Strategies, and The Information Professions in Society. I am familiar with metadata schema design and implementation. In my teaching I covered the design and implementation of metadata in databases, search engines, digital repositories, digital libraries, and digital archives. I also covered how information organization affects the discovery and access to digital resources on the Internet. My research interests cover cataloging and classification, information organization, metadata, information retrieval, information architecture, digital collections, scholarly communication, social media, user interaction with information systems, and others.

II. Background of Library Cataloging

A. Machine-Readable Cataloging ("MARC")

6. I am very familiar with a library cataloging encoding standard known as the "Machine-Readable Cataloging" standard, also known as "MARC," which became the national standard for sharing bibliographic data in the United States by

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1971 and the international standard by 1973. MARC is the primary communications protocol for the transfer and storage of bibliographic metadata in libraries. Experts in my field reasonably rely upon MARC records when forming their opinions.

7. A MARC record consists of 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 follows. **Appendix B** is a true and correct copy of Parts VII to X of "Understanding MARC Bibliographic: Machine-Readable Cataloging" (http://www.loc.gov/marc/umb/um07to10.html) from the Library of Congress that explains commonly used MARC fields. For example, the personal author of a work is recorded in Field 100, the title is recorded in Field 245, publisher information is recorded in Field 260, the physical volume and characteristics of a publication are recorded in Field 300, and topical subjects are recorded in Fields 650.

8. I am very familiar with library cataloging and processing practices and the relationships between OCLC (Online Computer Library Center) and library catalogs, and how libraries create and share their records to help the public discover and access information.

9. The Online Computer Library Center (OCLC) is the largest bibliographic network of the world, and its WorldCat database contains more than 554 million records from thousands of member institutions (many of which are

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libraries of some type) in more than 100 countries. OCLC was founded in 1967 to promote and support library cooperation. According to the "Third Article, Amended Articles of Incorporation of OCLC Online Computer Library Center, Inc.," 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" (source: https://www.oclc.org/content/dam/oclc/membership/articles-of-incorporation.pdf).

10. OCLC members can contribute original cataloging records in MARC to the system or derive cataloging records from existing records, an activity referred to as "copy cataloging." When an OCLC participating institution acquires a work, it can create an original MARC record for the work in OCLC's Connexion system (a system for catalogers to create and share MARC records), and the system will automatically generate a code for the date of record creation in the yymmdd format, and the creating library's OCLC symbol is recorded in subfield "a" of the 040 field.

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Once the MARC record is in Connexion, it becomes available to other OCLC members for adoption to their local online catalogs (*i.e.*, copy cataloging).

11. After a MARC record is created in Connexion, it also becomes searchable and viewable on WorldCat, which is a free web portal for users to explore more than 10,000 libraries worldwide. Records in WorldCat, however, are not presented in MARC fields. Instead, the data elements are labeled to help users interpret the records. Thus, the information stored in MARC records in Connexion is available to the interested public through the user-friendly WorldCat web portal. WorldCat records can also be searched on OCLC FirstSearch, a subscription-based search system that provides access to many proprietary databases, including the WorldCat database.

B. Library Online Catalogs

12. Library online catalogs gained acceptance in the early 1980s and many libraries migrated their systems to the World Wide Web in the mid-1990s. Library online catalogs are based on MARC records that represent their collections in order to help the public understand what materials are publicly accessible in those libraries. Most libraries with online catalogs have made their catalogs freely available on the Web. These online catalogs offer user-friendly search interfaces. Strong user interest in keyword searches and the popularity of Google have led to the "googlization" of library search systems. As a result, many library catalogs

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nowadays provide a single search box for users to conduct keyword searches, with additional support for searches by author, title, subject terms, and other data elements such as ISBN (International Standard Book Number). Library catalogs these days also offer features for users to narrow their search results by language, year, format, and other elements. Many libraries display MARC records on their online catalogs with labels for the data elements to help the public interpret MARC records. Many libraries also offer the option to display MARC records in MARC fields.

13. Libraries create MARC records for works they acquire, including books, serials, motion pictures, and publications in other formats. Monograph cataloging is fairly common in libraries, and most libraries make a newly cataloged monograph available to the public soon after the cataloging work is completed, usually within a week. Libraries can create original cataloging records or use an existing record in OCLC to create a copy cataloging record. As soon as the cataloging record is completed, it is added to the library's online catalog for users. If the record is an original record, it is also entered into the OCLC system. If it is a copy cataloging record, the library's holding symbol is attached to the existing original record in the OCLC system to facilitate searching and interlibrary loan.

14. The cataloging of serials and the serial check-in process are discussed here to show how libraries usually provide access to newly received serial issues.

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According to the glossary of the *RDA: Resource Description and Access* cataloging standard, a serial is "a mode of issuance of a manifestation issued in successive parts, usually bearing numbering, that has no predetermined conclusion. A serial includes a periodical, monographic series, newspaper, etc." (source: MARC proposal no. 2021-09, https://www.loc.gov/marc/mac/2021/2021-09.html). Because the publisher of a serial makes new issues of the serial available successively, a customary cataloging practice is to create one bibliographic record for the serial, and the serial record (encoded in MARC) typically provides information on the beginning date and frequency of the serial, not the dates of individual issues. In other words, libraries typically do not create MARC records for individual issues of a serial. Instead, they rely on a serial check-in system to track the receipt of new issues. A common check-in practice is to date stamp a new issue when it arrives. This practice has become automated since the late 1990s, and libraries now vary in how they share the receipt date of a new serial issue with the public. Some libraries use a date stamp, some affix a label to indicate the receipt date, some pencil in the receipt date, and some do not provide the information to the public.

15. The serial check-in process usually takes less than an hour, and one of the steps involves placing a date stamp on the new issue to document the date the issue is checked in. After that, the holdings information of the serial is updated in the library's catalog so that users know which issues are available for request or

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access. After serial check-in is completed, the new issue is placed on the shelf with the previous issues of the serial. Libraries with a public periodical room typically place new issues in the periodical room for easy user access. Because information presented in serials often reflects latest discovery, a general practice of libraries is to make new issues of serials available for user access soon after they are checked in, usually within a week.

16. I am personally familiar with many online catalogs, databases, and search engines. In preparing for this declaration, I used the following authoritative information systems to search for records:

- Google Scholar (https://scholar.google.com/)
- Internet Archive (https://archive.org/)
- Online catalog of Linda Hall Library (https://catalog.lindahall.org/)
- Online catalog of the Library of Congress (https://catalog.loc.gov/)
- Online catalog of the University of Wisconsin-Madison Library System (https://search.library.wisc.edu/search/system)
- WorldCat (https://search.worldcat.org/)

C. Scope of This Declaration

17. I have been asked to offer an opinion on the authenticity and public availability date of the documents listed in **Table 1**.

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18. I am rendering my expert opinion on the authenticity of the documents referenced herein and on whether these documents were published. I will provide my opinion on when and how these documents were publicly disseminated or otherwise made publicly available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, could have located and retrieved these documents.

19. 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, content, substance, internal patterns, protocols followed or other distinctive characteristics of the item.

20. I am informed by counsel that a given reference is "published" upon a satisfactory showing that such a document has been disseminated or otherwise made publicly available to the extent that persons interested and ordinarily skilled in the subject matter or art could locate it exercising reasonable diligence and obtain the document. I have also been informed by counsel that materials available in a library constitute "printed publications" if they are catalogued and indexed according to general library practices and protocols that make the references available and accessible to members of the interested public.

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21. I have been informed by counsel that the patent was filed in the United States and it claims "March 5, 2004" as its earliest priority date. I have assessed public accessibility of the documents referenced below as of this claimed priority date.

22. I have been informed by counsel that the subject matter of this proceeding generally relates to laser spallation techniques.

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

24. A person of ordinary skill in the art in March 5, 2004 would have had an M.S. in Mechanical Engineering or a related field, and at least five years of experience using laser systems to characterize and test mechanical behavior in materials. Additional work experience can substitute for specific educational background, and vice versa.

25. It is my opinion that such a person would have been actively engaged in learning about the field, possibly through formal instruction through the bibliographic resources. By at least 2003, such a person would have had access to a

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vast array of print and electronic resources, including at least the documents referenced below.

D. Evidence Considered in Forming My Opinion

26. In the preparation of this declaration, I have reviewed the documents referenced below and any other documents I reference herein, and each of these is a type of material that experts in my field would reasonably rely upon when forming their opinions. The supporting documents reviewed are presented as appendices in this declaration. See **Table 2** for details.

III. Authenticity and Public Availability of *Wang* (Ex. 1005)

A. Authentication

27. **Ex. 1005** is a true and correct copy of *Thin-Film Adhesion Measurement by Laser-Induced Stress Waves*, ("*Wang*"), by Junlan Wang, which is a doctoral dissertation completed in 2002 at the University of Illinois at Urbana-Champaign. **Ex. 1005** is a ProQuest copy of this dissertation. This copy is part of a declaration on *Wang* obtained by counsel from ProQuest. The ProQuest declaration is discussed further below.

28. Page 1 of **Ex. 1005** is the "Information to Users" page that states "[t]his manuscript has been reproduced from the microfilm master." Page 3 is the title page that shows the title, author, degree granting institution, and degree date ("2002"). Page 4 shows that the UMI number for this thesis is 3070468, and UMI Microform

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3070468 has a 2003 copyright date with ProQuest Information and Learning Company as the copyright holder. Page 5 shows the dissertation has a 2002 copyright date and the author holds the copyright. Page 6 shows an official recommendation, dated "July 2002" and signed by the author's department officials and doctoral committee, for the acceptance of this work for the degree of "Doctor of Philosophy." Internal pages iii and iv are the abstract, and internal pages vii and viii are the table of contents. **Ex. 1005** shows *Wang* includes five chapters, four appendices, tables, figures, references, and a vita, and the main text ends on internal page 154.

29. "With more than 5 million dissertations and theses, ProQuest Dissertations & Theses Global is the most comprehensive collection of dissertations and theses in the world." As "the official dissertations repository for the Library of Congress. It includes access to international scholarly works from USA, UK to Continental Europe, Africa to India and China" and is "updated weekly and features 24 indexed and searchable fields, including full text searchability for the entire text of full-text dissertations" (source: https://proquest.libguides.com/pqdt/content).

30. The ProQuest copy of *Wang* (**Ex. 1005**) is in a condition that creates no suspicion about its authenticity. Specifically, the front matter and the body of the text are not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the document. Moreover, **Ex. 1005** was found in the custody of a database known as the

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most comprehensive dissertations and theses database, a place where, if authentic, it would likely be found. I therefore see no reason to question the authenticity of this copy of *Wang*.

B. ProQuest Affidavit on *Wang*

31. **Ex. 1035** is a true and correct copy of a declaration of Ms. LaTonya Morris of ProQuest LLC that I received from counsel. Paragraph 3 states that before 2013, "[a] 'Record' of each dissertation and each master's thesis submitted to ProQuest was published in ProQuest's print publication Dissertations Abstracts International or Master's Abstracts International, respectively." Paragraph 4 states that starting in 1985 dissertations and theses indexed by ProQuest were searchable in the "Abstract Database which was made available online through third party vendors, such as Dialog, Data-Star, and OCLC" and in 1997, "ProQuest made available the contents of the Abstract Database in its ProQuest Digital Dissertations and Theses database ("PQDT"), which is accessible via the world wide web to authenticated subscribers. The Abstract Database allows for text searching of the Records, including the title, author, index terms and the abstract." These statements confirm my understanding that the standard practice of ProQuest is to create records for theses and dissertations submitted to ProQuest. While the records were in print earlier, starting in 1985, ProQuest has made their records searchable in the Abstract Database, and starting in 1997, the contents of the Abstract Database became

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searchable in PQDT. In addition, Paragraph 5 states that "PQDT allows for text searching for the Records as well as full text where the full PDF is properly formatted." This means that after the full PDF is properly formatted, the full text of a thesis becomes searchable.

32. Ms. Morris states in Paragraph 8 that the full text of *Wang* was "First Made Available for Sale in PDF format and placed in PQDT" on "2003-03-04" (*i.e.*, March 4, 2003). Paragraph 9 further clarifies that "the full text of the Dissertation was available for sale to the public as of 3/4/2003."

33. In addition, Paragraph 10 states that "As of 3/4/2003, the title, author, granting institution, and degree date of the Dissertation … was available digitally on PQDT, as part of the Record for the Dissertation" and Paragraph 11 states that "as of 3/4/2003, the Abstract of the Dissertation was available digitally on PQDT, as part of the Record for the Dissertation." These statements, together with the statements on how searches are supported (per Paragraphs 4 and 5), inform my opinion that, as of March 4, 2003, the data elements in the record for *Wang* (such as the title, author, index terms, and the abstract) became searchable in PQDT. It is therefore my opinion that, as of March 4, 2003, interested users, would be able to search ProQuest to discover *Wang* and access it freely from any institutions that subscribe to PQDT.

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C. Summary of My Opinion on *Wang*

34. **Ex. 1005** is authentic because it is a reproduction from the thesis approved by the author's department and doctoral committee, and the reproduction is made by ProQuest, a comprehensive and authoritative source of theses and dissertations, after the thesis was submitted to ProQuest. The thesis itself shows no signs of alterations and raises no suspicion about its authenticity. The declaration of Ms. LaTonya Morris (**Ex. 1035**) shows that *Wang* became available for sale on March 4, 2003. Furthermore, as of March 4, 2003, the ProQuest record for *Wang* became searchable in ProQuest. It is therefore my conclusion that, as of March 4, 2003, interested users at institutions that subscribed to PQDT would be able to search by the title, author, index terms, and the abstract to discover and access the *Wang* dissertation.

IV. Authenticity and Public Availability of *Anderholm* (Ex. 1007)

A. Authentication

35. **Exhibit 1007** is a true and correct copy of "Laser-generated stress waves," ("*Anderholm*"), by N. C. Anderholm, *Applied Physics Letters*, 16(3), 113-115, that I obtained from Library of Congress. When I began researching this article, I searched WorldCat for libraries holding the journal containing *Anderholm*, and located a record (https://search.worldcat.org/title/1580952) that showed Library of Congress was one of the holding libraries. After verifying the holdings information

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in their online catalog, I obtained a scan copy of *Anderholm* from Library of Congress through a document vendor. This library copy is presented as **Ex. 1007** in this declaration.

36. Page 1 of **Ex. 1007** shows the covers and spine of a bound volume, and the spine identifies this volume as "Applied Physics Letters 17 Jan.-June.1970" whose call number is "QC1 .A74." Page 2 shows the front cover of volume 16, number 3 of *Applied Physics Letter* that has a "1 February 1970" issue date, and shows the American Institute of Physics as the publisher. Page 3 shows the publisher page that indicates the journal is published "semimonthly." It also shows internal page 87 of this journal issue that carries a date stamp of "Copyright Office APR 28 1970 Library of Congress." The left side of page 4 shows the table of contents of volume 16, number 3, that indicates *Anderholm* begins on page 113. Pages 6 and 7 shows the full text of *Anderholm* runs from internal page 113 to internal page 115. Internal page 113 shows the title, author, and abstract, and indicates the manuscript was received on "10 November 1969." **Ex. 1007** shows *Anderholm* has a total of three pages, including two figures and 23 references.

37. **Ex. 1007** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Anderholm* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my

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opinion that **Ex. 1007** is an authentic copy of *Anderholm* and I see no reason to question its authenticity.

B. Library of Congress Records

38. To determine when *Anderholm* became publicly accessible I searched the online catalog of the Library of Congress for records for the journal containing this article. **Appendix 1007A** is a true and correct copy of the bibliographic and MARC records for *Applied Physics Letters*. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions.

39. Pages 1 to 6 of **Appendix 1007A** are the bibliographic record for *Applied Physics Letters* that shows the title, publisher, LCCN (Library of Congress control number), publication frequency information over time, ISSN (International Standard Serial Number), CODEN (the six character code that uniquely identified serial publications), and OCLC number for this record. The Availability area shows the library holdings, indicating volume 16, number 3 that contains *Anderholm* is held at this library.

40. Pages 7 to 12 are the MARC record for *Applied Physics Letters*. The first six digits of Field 008 show this record was created on "750829" (*i.e.*, August 29, 1975), and the "c19629999" code following the record creation date indicates the journal is an ongoing publication that began publication in 1962 and has no end

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date of publication. Subfield "a" of Field 040 shows "DLC" (the OCLC symbol for Library of Congress) created the original serial MARC record.

41. Field 010 shows "64006603" as the Library of Congress control number, Field 022 shows "0003-6951" as the ISSN of this journal, Field 030 shows "APPLAB" as the CODEN of this journal, and Field 035 shows "01580952" as the OCLC number for this record. Field 245 shows the journal title. Field 260 shows the publisher and its location. Field 362 shows the journal began publication in September 1962, and Field 321 shows "Semimonthly" was the publication frequency of this journal between 1963 and 1985. Field 580 shows this journal is "issued as companion to: Journal of applied physics." Field 710 shows the issuing body is included in the MARC record to help users discover this journal.

42. Subjects are represented in Field 050 by a Library of Congress Classification (LCC) number of "QC1" that represents periodicals on physics, and in Field 082 by a Dewey Decimal Classification (DDC) number of 530 that represents general works on physics. Subject is also represented in Field 650 by a Library of Congress subject heading, with "Physics" as the main topic, followed by a form subheading "Periodicals" to indicate this publication is a periodical on physics. The classification numbers and the subject heading support users to conduct subject searches to discover this journal.

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43. This MARC record (**Appendix 1007A)** shows that *Applied Physics Letters* is a long-running journal, and the MARC serial record has made it discoverable at the Library of Congress since 1975. Users would have been able to conduct subject searches by the LCC number, the DDC number, and the Library of Congress subject heading in the MARC record to discover this journal. They would also have been able to search for this journal by the LCCN, ISSN, CODEN, title, and the issuing body of this journal.

44. The date stamp on the library copy of *Anderholm* (**Ex. 1007**) shows the issue containing *Anderholm* was received on "APR 28 1970." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access, usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Anderholm* would have become publicly accessible no later than May 5, 1970, at the Library of Congress.

C. Usage Record

45. Actual usage of a publication is reflected by other publications that make reference to it. I used Google Scholar to compile a list of five citations to *Anderholm* that were published from 1971 and 1972 to demonstrate early usage (**Appendix 1007B**). The earliest citation appeared in January 1971.

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D. Summary of My Opinion on *Anderholm*

46. **Ex. 1007** is authentic because *Anderholm* appears in a journal published by an authoritative body and the journal issue is held by Library of Congress. The article itself contains no signs of alterations and raises no suspicion of its authenticity. The MARC serial record of the Library of Congress (**Appendix 1007A**) shows the journal has been discoverable at the library since 1975. The date stamp on **Ex. 1007** shows the issue containing *Anderholm* was received by the library on April 28, 1970. It is therefore my opinion that *Anderholm* would have been publicly accessible by May 5, 1970. Citation record shows the earliest citation appeared in January 1971.

V. Authenticity and Public Availability of *Fox* (Ex. 1008)

A. Authentication

47. **Exhibit 1008** is a true and correct copy of "Laser-induced shock effects in Plexiglas and 6061-T6 aluminum," ("*Fox*"), by Fox et al., *Applied Physics Letters*, 22(11), 594-596, that I obtained from Library of Congress. When I began researching this article, I searched WorldCat for libraries holding the journal containing *Fox*, and located a record (https://search.worldcat.org/title/1580952) that showed Library of Congress was one of the holding libraries. After verifying the holdings information in their online catalog, I obtained a scan copy of *Fox* from

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Library of Congress through a document vendor. This library copy is presented as **Ex. 1008** in this declaration.

48. Page 1 of **Ex. 1008** shows the covers and spine of a bound volume, and the spine identifies this volume as "Applied Physics Letters 22 Jan.-June.1973" whose call number is "QC1 .A74." Page 2 shows the front cover of volume 22, number 11 of *Applied Physics Letter* that has a "1 June 1973" issue date, and shows this journal is a publication of the American Institute of Physics. Page 3 shows the publisher page that indicates the journal is published "semimonthly." Page 4 is the table of contents that shows *Fox* begins on page 594, and also shows a date stamp of "Copyright Office MAY 31 1973 Library of Congress." Pages 5 to 7 are the full text of *Fox*, and page 5 shows the title, author, abstract, and a note indicating the manuscript was received on "2 February 1973; in final form 19 March 1973." **Ex. 1008** shows *Fox* has three pages, including three figures and eight references.

49. **Ex. 1008** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Fox* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my opinion that **Ex. 1008** is an authentic copy of *Fox* and I see no reason to question its authenticity.

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B. Library of Congress Records

50. To determine when *Fox* became publicly accessible I searched the online catalog of the Library of Congress for records for the journal containing this article. **Appendix 1008A** is a true and correct copy of the bibliographic and MARC records for *Applied Physics Letters*. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions.

51. Pages 1 to 6 of **Appendix 1008A** are the bibliographic record for *Applied Physics Letters* that shows the title, publisher, LCCN (Library of Congress control number), publication frequency information over time, ISSN (International Standard Serial Number), CODEN (the six character code that uniquely identified serial publications), and OCLC number for this record. The Availability area shows the library holdings, indicating volume 22, number 11 that contains *Fox* is held at this library.

52. Pages 7 to 12 are the MARC record for *Applied Physics Letters*. The first six digits of Field 008 show this record was created on "750829" (*i.e.*, August 29, 1975), and the "c19629999" code following the record creation date indicates the journal is an ongoing publication that began publication in 1962 and has no end date of publication. Subfield "a" of Field 040 shows "DLC" (the OCLC symbol for Library of Congress) created the original MARC serial record.

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53. Field 010 shows "64006603" as the Library of Congress control number, Field 022 shows "0003-6951" as the ISSN of this journal, Field 030 shows "APPLAB" as the CODEN of this journal, and Field 035 shows "01580952" as the OCLC number for this record. Field 245 shows the journal title. Field 260 shows the publisher and its location. Field 362 shows the journal began publication in September 1962, and Field 321 shows "Semimonthly" was the publication frequency of this journal between 1963 and 1985. Field 580 shows this journal is "issued as companion to: Journal of applied physics." Field 710 shows the issuing body is included in the MARC record to help users discover this journal.

54. Subjects are represented in Field 050 by a Library of Congress Classification (LCC) number of "QC1" that represents periodicals on physics, and in Field 082 by a Dewey Decimal Classification (DDC) number of 530 that represents general works on physics. Subject is also represented in Field 650 by a Library of Congress subject heading, with "Physics" as the main topic, followed by a form subheading "Periodicals" to indicate this publication is a periodical on physics. The classification numbers and the subject heading support users to conduct subject searches to discover this journal.

55. This MARC record (**Appendix 1008A)** shows that *Applied Physics Letters* is a long-running journal, and the MARC serial record has made it discoverable at the Library of Congress since 1975. Users would have been able to

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conduct subject searches by the LCC number, the DDC number, and the Library of Congress subject heading in the MARC record to discover this journal. They would also have been able to search for this journal by the LCCN, ISSN, CODEN, title, and the issuing body of this journal.

56. The date stamp on the library copy of *Fox* (**Ex. 1008**) shows the issue containing *Fox* was received on "May 31 1973." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access, usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Fox* would have become publicly accessible no later than June 7, 1973, at the Library of Congress.

C. Usage Record

57. Actual usage of a publication is reflected by other publications that make reference to it. I used Google Scholar to compile a list of four citations to *Fox* that were published in 1974 an 1975 to demonstrate early usage (**Appendix 1008B**). The earliest citation appeared in May 1974.

D. Summary of My Opinion on *Fox*

58. **Ex. 1008** is authentic because *Fox* appears in a journal published by an authoritative body and the journal issue is held by Library of Congress. The article itself contains no signs of alterations and raises no suspicion of its authenticity. The

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MARC serial record of the Library of Congress (**Appendix 1008A**) shows the journal has been discoverable at the library since 1975. The date stamp on **Ex. 1008** shows the issue containing *Fox* was received by the library on May 31, 1973. It is therefore my opinion that *Fox* would have been publicly accessible by June 7, 1973. Citation record shows the earliest citation appeared in May 1974.

VI. Authenticity and Public Availability of *Yang* (Ex. 1009)

A. Authentication

59. **Exhibit 1009** is a true and correct copy of "Stress waves generated in thin metallic films by a Q-switched ruby laser," ("*Yang*"), by L. C. Yang, *Journal of Applied Physics*, 45(6), 2601-2608, that I obtained from the University of Wisconsin-Madison Library System. When I began researching this article, I searched WorldCat for libraries holding the journal containing *Yang*, and located a record (https://search.worldcat.org/title/1754449) that showed the University of Wisconsin-Madison Library System held this journal. After verifying the holdings information in their online catalog, I obtained a scan copy of *Yang* from this library through a document vendor. This library copy is presented as **Ex. 1009** in this declaration.

60. Page 2 of **Ex. 1009** shows the cover that identifies this issue as volume 45, number 6 (June 1974) of *Journal of Applied Physics* and indicates this journal is a publication of the American Institute of Physics. It also shows a date stamp of

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"JUN 11 1974" that indicates this issue was received by the library on June 11, 1974. Page 3 is the publisher information page that shows this journal is published monthly by the American Institute of Physics. Pages 4 to 7 (internal pages i to iv) are the table of contents and internal page ii shows *Yang* begins on page 2601. Pages 8 to 15 (internal pages 2601 to 2608) are the full text of *Yang*, and internal page 2601 shows the title, author, and abstract, and indicates the manuscript was received on "18 February 1974." **Ex. 1009** shows *Yang* has a total of eight pages, including five figures and 30 references.

61. **Ex. 1009** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Yang* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my opinion that **Ex. 1009** is an authentic copy of *Yang* and I see no reason to question its authenticity.

B. University of Wisconsin-Madison Library Records

62. To determine when *Yang* became publicly accessible I searched the online catalog of the University of Wisconsin-Madison Library System for records for the journal containing this article. **Appendix 1009A** is a true and correct copy of the bibliographic and MARC records for *Journal of Applied Physics*. I personally identified, located, and obtained these records. They are the type of records experts

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in my field would reasonably rely upon when forming their opinions. I used screen captures to produce this appendix.

63. Pages 1 to 4 of **Appendix 1009A** are the bibliographic record for *Journal of Applied Physics* that shows the title, format, language, contributors, publisher, publication date, ISSN, and OCLC number of this journal record. The "Science Libraries Shelving Facility" on page 2 shows the library holdings includes volume 46, number 6 that contains *Yang*.

64. Pages 5 to 8 are the MARC record for *Journal of Applied Physics*. The first six digits of Field 008 show this record was created on "751101" (*i.e.*, November 1, 1975), and the "c19379999" code following the record creation date indicates the journal is an ongoing publication that began publication in 1937 and has no end date of publication. Subfield "a" of Field 040 shows "MUL" (the Minnesota Union List) created the original MARC serial record, and Field 049 shows "GZM" (the OCLC symbol for the University of Wisconsin-Madison) holds this journal.

65. Field 022 shows "0021-8979" as the ISSN of this journal and Field 035 shows "01754449" as the OCLC number for this record. Field 245 shows the journal title. Field 260 shows the publisher has published this journal since 1937. Field 362 shows the journal began publication in January 1937, and Field 321 shows "Monthly" was the publication frequency of this journal between 1937 and 1983.

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Field 550 shows this journal is published "in cooperation with the American Physical Society." Fields 710 show the American Institute of Physics and the American Physical Society are included in the MARC serial record to help users discover this journal.

66. Subjects are represented in Field 050 by a Library of Congress Classification (LCC) number of "QC1" that represents periodicals on physics, and in Field 082 by a Dewey Decimal Classification (DDC) number of 530.5 that represents periodicals on physics. Subject is also represented in Field 650 by a Library of Congress subject heading, with "Physics" as the main topic, followed by a form subheading "Periodicals" to indicate this publication is a periodical on physics. The classification numbers and the subject heading support users to conduct subject searches to discover this journal.

67. This MARC record (**Appendix 1009A)** shows that *Journal of Applied Physics* is a long-running journal, and the MARC serial record has made it discoverable at the University of Wisconsin-Madison Library System. The date stamp on **Ex. 1009** shows the issue containing *Yang* was received by the library system on June 11, 1974, so the journal record would have been discoverable by at least June 1974 at the library's catalog. Users would have been able to conduct subject searches by the LCC number, the DDC number, and the Library of Congress subject heading in the MARC record to discover this journal. They would also have

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been able to search for this journal by the ISSN, title, and the two organizations involved in the publication of this journal.

68. The date stamp on the library copy of *Yang* (**Ex. 1009**) shows the issue containing *Yang* was received on "Jun 11 1974." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access, usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Yang* would have become publicly accessible no later than June 18, 1974.

C. Usage Record

69. Actual usage of a publication is reflected by other publications that make reference to it. I used Google Scholar to compile a list of five citations to *Yang* that were published from 1974 and 1978 to demonstrate early usage (**Appendix 1009B**). The earliest citation appeared in October 1974.

D. Summary of My Opinion on *Yang*

70. **Ex. 1009** is authentic because *Yang* appears in a journal published by an authoritative body (and supported by the American Physical Society), and the journal issue is held by the University of Wisconsin-Madison Library System. The article itself contains no signs of alterations and raises no suspicion of its authenticity. The MARC serial record of this library system (**Appendix 1009A**) and the date stamp inform my opinion that this journal would have been discoverable at

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the library's catalog by June 1974. The date stamp on **Ex. 1009** shows the issue containing *Yang* was received by the library on June 11, 1974. It is therefore my opinion that *Yang* would have been publicly accessible by June 18, 1974. Citation record shows the earliest citation appeared in October 1974.

VII. Authenticity and Public Availability of *Stephens* (Ex. 1010)

A. Authentication

71. **Exhibit 1010** is a true and correct copy of "Abstract: Measurement of interfacial bond strength by laser spallation," ("Stephens"), by Stephens and Vossen, *Journal of Vacuum Science and Technology*, 13(1), 38-39, that I obtained from Linda Hall Library. When I began researching this article, I searched WorldCat for libraries holding the journal containing Stephens, and located a record (https://search.worldcat.org/title/1754855) that showed Linda Hall Library is one of the holding libraries of this journal. After verifying the holdings information in their online catalog, I obtained a scan copy of *Stephens* from Linda Hall Library through a document vendor. This library copy is presented as **Ex. 1010** in this declaration.

72. Page 1 is the cover that identifies this issue as volume 13, number 1 (January/February 1976) of *Journal of Vacuum Science & Technology*, and the bottom of this page indicates this journal is the official journal of the American Vacuum Society and is published for the society by the American Institute of Physics. The cover carries a date stamp of Linda Hall Library "APR 6 1976"

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indicating the library received this issue on April 6, 1976. Page 2 is the publication information page. Pages 3 to 12 are the table of contents and page 3 shows *Stephens* begins on internal page 38. Pages 13 and 14 are the full text of **Ex. 1010**, and page 13 (internal page 38) shows the title, authors, and indicates the abstract was received on "2 September 1975; in final form 2 October 1975." The bottom of internal page 38 shows *Stephens* has a "1976" copyright date and the American Vacuum Society is the copyright holder.

73. **Ex. 1010** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Stephens* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my opinion that **Ex. 1010** is an authentic copy of *Stephens* and I see no reason to question its authenticity.

B. Linda Hall Library Records

74. To determine when *Stephens* became publicly accessible I searched the online catalog of the Linda Hall Library for records for the journal containing this article. **Appendix 1010A** is a true and correct copy of the bibliographic and MARC records for *The Journal of Vacuum Science and Technology*. I personally identified, located, and obtained these records. They are the type of records experts in my field

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would reasonably rely upon when forming their opinions. I used screen captures to produce this appendix.

75. Pages 1 to 3 of **Appendix 1010A** are the bibliographic record for the journal containing *Stephens*. Pages 1 and 2 show the journal is available at Linda Hall Library Closed Stacks – Serials, and the library holds vol. 13 that contains Stephens. Pages 2 and 3 show bibliographical details, including title, other title, creator and contributor, subjects, identifiers, related titles, publisher, creation date, format, frequency, general notes, and citations note.

76. Pages 4 and 5 are the MARC record. The first six digits of Field 008 show the record was created on "751101" (*i.e.*, November 1, 1975), and the code of "d19641982" following the record creation date indicates the journal began publication in 1964 and ceased publication in 1982. Subfield "a" of Field 040 shows "MUL" (the Minnesota Union List) created the original MARC serial record, and Field 049 shows "LHL" (the OCLC symbol for Linda Hall Library) holds this journal.

77. Field 022 shows "0022-5355" as the ISSN of this journal and Field 035 shows "1754855" as the OCLC number for this record. Field 245 shows the journal title. Field 260 shows the publisher. Field 362 shows the journal began publication with vol. 1, no. 1 (Sept./Oct. 1964) and concluded with v. 21, no. 4 (Nov./Dec. 1982). Field 321 shows "Bimonthly" was the publication frequency between 1964 and

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1980. Fields 710 show the American Institute of Physics and the American Vacuum Society are included in the MARC serial record to help users discover this journal.

78. Subject is represented in Field 650 by a Library of Congress subject heading, with "Vacuum technology" as the main topic, followed by a form subheading "Periodicals" to indicate the main topic is treated in a periodical. The original MARC record created by the Library of Congress includes two classification numbers in Field 050 and Field 082 to represent the subject of this journal, but those numbers are not used at Linda Hall Library because the library arranges journals by title. The subject heading support users to conduct subject searches to discover this journal.

79. This MARC record (**Appendix 1010A**) shows that *The Journal of Vacuum Science and Technology* was a long-running journal that concluded publication in 1982, and the MARC serial record has made it discoverable at Linda Hall Library. The date stamp on **Ex. 1010** shows the issue containing *Stephens* was received by the library system on April 6, 1976, so it is my opinion that this journal would have been discoverable in the library's catalog by at least April 1976. Users would have been able to search by the Library of Congress subject heading in the MARC record to discover this journal. They would also have been able to search for this journal by the ISSN, title, the American Institute of Physics, and the American Vacuum Society.

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80. The date stamp on the library copy of *Stephens* (**Ex. 1010**) shows the issue containing *Stephens* was received on "APR 6 1976." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access, usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Stephens* would have become publicly accessible no later than April 13, 1976.

C. Usage Record

81. Actual usage of a publication is reflected by other publications that make reference to it. I used Google Scholar to compile a list of four citations to *Stephens* that were published from 1978 and 1988 to demonstrate usage (**Appendix 1010B**). The earliest citation appeared in January 1978.

D. Summary of My Opinion on *Stephens*

82. **Ex. 1010** is authentic because the article shows no signs of alterations and raises no suspicion about its authenticity. The MARC serial record of Linda Hall Library (**Appendix 1010A**) and the date stamp inform my opinion that this journal would have been discoverable at the library's catalog by April 1976. The date stamp on **Ex. 1010** shows the issue containing *Stephens* was received by the library on April 6, 1976. It is therefore my opinion that *Stephens* would have been publicly

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accessible by April 13, 1976. Citation record shows the earliest citation appeared in January 1978.

VIII. Authenticity and Public Availability of *Gupta-1992* (Ex. 1011)

A. Authentication

83. **Exhibit 1011** is a true and correct copy of "Measurement of interface strength by a laser spallation technique," ("*Gupta-1992*"), by Gupta et al., *Journal of the Mechanics and Physics of Solids*, 40(1), 141-180, that I obtained from Linda Hall Library. When I began researching this article, I searched WorldCat for libraries holding the journal containing *Gupta-1992*, and located a record (https://search.worldcat.org/title/1782726) that showed Linda Hall Library is one of the holding libraries of this journal. After verifying the holdings information in their online catalog, I obtained a scan copy of *Gupta-1992* from Linda Hall Library through a document vendor. This library copy is presented as **Ex. 1011** in this declaration.

84. Pages 1 to 40 (internal pages 141 to 180) are the full text of *Gupta-1992*, and internal page 141 shows the title, authors, abstract, and indicates the manuscript was received on "24 September 1990." It also shows the article appears in *Journal of the Mechanics and Physics of Solids* whose ISSN is "0022-5096" and has a "1991" copyright date with Pergamon Press plc as the copyright holder. **Ex.**

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1011 shows *Gupta-1992* has a total of 40 pages, including seven tables, 23 figures, 21 equations, 36 reference and two appendices.

85. Page 1 is the cover that identifies this issue as volume 40, number 1 (issue date January 1992) of *Journal of the Mechanics and Physics of Solids* published by Pergamon Press. The cover carries a date stamp of "Linda Hall Library JAN 2 1992" indicating the issue was received by the library on January 2, 1992. Page 45 is the table of contents of vol. 40, no. 1 that shows *Gupta-1992* begins on page 141.

86. **Ex. 1011** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Gupta-1992* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my opinion that **Ex. 1011** is an authentic copy of *Gupta-1992* and I see no reason to question its authenticity.

B. Linda Hall Library Records

87. To determine when *Gupta-1992* became publicly accessible I searched the online catalog of the Linda Hall Library for records for the journal containing this article. **Appendix 1011A** is a true and correct copy of the bibliographic and MARC records for *Journal of the Mechanics and Physics of Solids*. I personally identified, located, and obtained these records. They are the type of records experts

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in my field would reasonably rely upon when forming their opinions. I used screen captures to produce this appendix.

88. Pages 1 to 3 of **Appendix 1011A** are the bibliographic record for the journal containing *Gupta-1992*. Pages 1 and 2 show the journal is available at Linda Hall Library Closed Stacks – Serials, and the library holds vol. 40 that contains *Gupta-1992*. Page 3 shows bibliographical details, including title, other title, creator and contributor, subjects, identifiers, publisher, creation date, format, general notes and citations note.

89. Pages 4 and 5 are the MARC record. The first six digits of Field 008 show the record was created on "740606" (*i.e.*, June 6, 1974), and the code of "c19529999" following the record creation date indicates the journal is an ongoing publication that began publication in 1952 and has no end date of publication. Subfield "a" of Field 040 shows "DLC" (the OCLC symbol for Library of Congress) created the original MARC serial record, and Field 049 shows "LHL" (the OCLC symbol for Linda Hall Library) holds this journal.

90. Field 022 shows "0022-5096" as the ISSN of this journal and Field 035 shows "1782726" as the OCLC number for this record. Field 245 shows the journal title. Field 260 shows the publisher. Field 362 shows the journal began publication in October 1952. Field 500 shows two editors, and Fields 710 show these two editors are included in the MARC serial record to help users discover this journal.

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91. Subject is represented in Fields 650 by two Library of Congress subject headings, with "Mechanics, Applied" and "Solids" as the main topics, each followed by a form subheading "Periodicals" to indicate the main topics are treated in a periodical. The original MARC record created by the Library of Congress includes a classification number in Field 050 to represent the subject, but this number is not used at Linda Hall Library because the library arranges journals by title. The subject headings support users to conduct subject searches to discover this journal.

92. This MARC record (**Appendix 1011A**) shows that *Journal of the Mechanics and Physics of Solids* is a long-running journal, and the MARC serial record has made it discoverable at Linda Hall Library. The date stamp on **Ex. 1011** shows the issue containing *Gupta-1992* was received by the library system on January 2, 1992, so it is my opinion that this journal would have been discoverable in the library's online catalog by at least January 1992. Users would have been able to conduct subject searches by the Library of Congress subject headings in the MARC record to discover this journal. They would also have been able to search for this journal by the ISSN, title, and the two editors.

93. The date stamp on the library copy of *Gupta-1992* (**Ex. 1011**) shows the issue containing *Gupta-1992* was received on "January 2 1992." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access,

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usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Gupta-1992* would have become publicly accessible no later than January 9, 1992.

C. Usage Record

94. Actual usage of a publication is reflected by other publications that make reference to it. I used Google Scholar to compile a list of five citations to *Gupta-1992* that were published from 1992 and 1995 to demonstrate usage (**Appendix 1011B**). The earliest citation appeared in October 1992.

D. Summary of My Opinion on *Gupta-1992*

95. **Ex. 1011** is authentic because *Gupta-1992* shows no signs of alterations and raises no suspicion about its authenticity. The MARC serial record of Linda Hall Library (**Appendix 1011A**) and the date stamp inform my opinion that this journal would have been discoverable at the library's catalog by January 1992. The date stamp on **Ex. 1011** shows the issue containing *Gupta-1992* was received by the library on January 2, 1992. It is therefore my opinion that *Gupta-1992* would have been publicly accessible by January 9, 1992. Citation record shows the earliest citation appeared in October 1992.

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IX. Authenticity and Public Availability of *Yuan-I* (Ex. 1012)

A. Authentication

96. **Exhibit 1012** is a true and correct copy of "Measurement of interface strength by the modified laser spallation technique. I. Experiment and simulation of the spallation process," ("*Yuan-I*"), by Yuan and Gupta, *Journal of Applied Physics*, 74(4), 2388-2396, that I obtained from the University of Wisconsin-Madison Library System. When I began researching this article, I searched WorldCat for libraries holding the journal containing *Yuan-I*, and located a record (https://search.worldcat.org/title/1754449) that showed the University of Wisconsin-Madison Library System held this journal. After verifying the holdings information in their online catalog, I obtained a scan copy of *Yuan-I* from this library through a document vendor. This library copy is presented as **Ex. 1012** in this declaration.

97. Page 2 of **Ex. 1012** shows the cover that identifies this issue as volume 74, number 4 (15 August 1993) of *Journal of Applied Physics* and indicates this journal is a publication of the American Institute of Physics. Page 3 is the publisher information page that shows this journal is published semimonthly by the American Institute of Physics with the cooperation of The American Physical Society. Pages 4 to 10 are the table of contents and page 4 shows a date stamp of "Aug 18 1993" that indicates this issue was received by the library on August 18, 1993. Pages 11 to 19

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(internal pages 2388 to 2396) are the full text of *Yuan-I*, and internal page 2388 shows the title, authors, and abstract, and indicates the manuscript was received on "9 October 1992; accepted for publication 3 May 1993." The bottom of the page shows this article appears in a journal whose ISSN is "0021-8979" and has a "1993" copyright date with the American Institute of Physics as the copyright holder. **Ex. 1012** shows *Yuan-I* has a total of nine pages, including nine figures, nine equations, and 15 references.

98. **Ex. 1012** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Yuan-I* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my opinion that **Ex. 1012** is an authentic copy of *Yuan-I* and I see no reason to question its authenticity.

B. University of Wisconsin-Madison Library Records

99. To determine when *Yuan-I* became publicly accessible I searched the online catalog of the University of Wisconsin-Madison Library System for records for the journal containing this article. **Appendix 1012A** is a true and correct copy of the bibliographic and MARC records for *Journal of Applied Physics*. I personally identified, located, and obtained these records. They are the type of records experts

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in my field would reasonably rely upon when forming their opinions. I used screen captures to produce this appendix.

100. Pages 1 to 4 of **Appendix 1012A** are the bibliographic record for *Journal of Applied Physics* that shows the title, format, language, contributors, publisher, publication date, ISSN, and OCLC number of this journal record. The "Science Libraries Shelving Facility" on page 2 shows the library holdings includes volume 74, number 4 that contains *Yuan-I*.

101. Pages 5 to 8 are the MARC record for *Journal of Applied Physics*. The first six digits of Field 008 show this record was created on "751101" (*i.e.*, November 1, 1975), and the "c19379999" code following the record creation date indicates the journal is an ongoing publication that began publication in 1937 and has no end date of publication. Subfield "a" of Field 040 shows "MUL" (the Minnesota Union List) created the original MARC serial record, and Field 049 shows "GZM" (the OCLC symbol for the University of Wisconsin-Madison) holds this journal.

102. Field 022 shows "0021-8979" as the ISSN of this journal and Field 035 shows "01754449" as the OCLC number for this record. Field 245 shows the journal title. Field 260 shows the publisher has published this journal since 1937. Field 362 shows the journal began publication in January 1937, and Field 321 shows "Monthly" was the publication frequency of this journal between 1937 and 1983.

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Field 550 shows this journal is published "in cooperation with the American Physical Society." Fields 710 show the American Institute of Physics and the American Physical Society are included in the MARC serial record to help users discover this journal.

103. Subjects are represented in Field 050 by a Library of Congress Classification (LCC) number of "QC1" that represents periodicals on physics, and in Field 082 by a Dewey Decimal Classification (DDC) number of 530.5 that represents periodicals on physics. Subject is also represented in Field 650 by a Library of Congress subject heading, with "Physics" as the main topic, followed by a form subheading "Periodicals" to indicate this publication is a periodical on physics. The classification numbers and the subject heading support users to conduct subject searches to discover this journal.

104. This MARC record (**Appendix 1012A**) shows that *Journal of Applied Physics* is a long-running journal, and the MARC serial record has made it discoverable at the University of Wisconsin-Madison Library System. The date stamp on **Ex. 1012** shows the issue containing *Yuan-I* was received by the library system on August 18, 1993, so the journal record would have been discoverable by at least August 1993 at the library's catalog. Users would have been able to conduct subject searches by the LCC number, the DDC number, and the Library of Congress subject heading in the MARC record to discover this journal. They would also have

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been able to search for this journal by the ISSN, title, and the two organizations involved in the publication of this journal.

105. The date stamp on the library copy of *Yuan-I* (**Ex. 1012**) shows the issue containing *Yuan-I* was received on "AUG 18 1993." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access, usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Yuan-I* would have become publicly accessible no later than August 25, 1993.

C. Usage Record

106. Actual usage of a publication is reflected by other publications that make reference to it. I used Google Scholar to compile a list of five citations to *Yuan-I* that were published from 1995 and 1997 to demonstrate usage (**Appendix 1012B**). The earliest citation appeared in January 1995.

D. Summary of My Opinion on *Yuan-I*

107. **Ex. 1012** is authentic because *Yuan-I* appears in a journal published by an authoritative body (in cooperation with the American Physical Society), and the journal issue is held by the University of Wisconsin-Madison Library System. The article itself contains no signs of alterations and raises no suspicion of its authenticity. The MARC serial record of this library system (**Appendix 1012A**) and

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the date stamp inform my opinion that this journal would have been discoverable at the library's catalog by August 1993. The date stamp on **Ex. 1012** shows the issue containing *Yuan-I* was received by the library on August 18, 1993. It is therefore my opinion that *Yuan-I* would have been publicly accessible by August 25, 1993. Citation record shows the earliest citation appeared in January 1995.

X. Authenticity and Public Availability of *Yuan-III* (Ex. 1013)

A. Authentication

108. **Exhibit 1013** is a true and correct copy of "Measurement of interface strength by the modified laser spallation technique. III. Experimental optimization of the stress pulse," ("*Yuan-III*"), by Yuan et al., *Journal of Applied Physics*, 74(4), 2405-2410, that I obtained from the University of Wisconsin-Madison Library System. When I began researching this article, I searched WorldCat for libraries holding the journal containing *Yuan-III*, and located a record (https://search.worldcat.org/title/1754449) that showed the University of Wisconsin-Madison Library System held this journal. After verifying the holdings information in their online catalog, I obtained a scan copy of *Yuan-III* from this library through a document vendor. This library copy is presented as **Ex. 1013** in this declaration.

109. Page 2 of **Ex. 1013** shows the cover that identifies this issue as volume 74, number 4 (15 August 1993) of *Journal of Applied Physics* and indicates this

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journal is a publication of the American Institute of Physics. Page 3 is the publisher information page that shows this journal is published semimonthly by the American Institute of Physics with the cooperation of The American Physical Society. Pages 4 to 10 are the table of contents and page 4 shows a date stamp of "Aug 18 1993" that indicates this issue was received by the library on August 18, 1993. Pages 11 to 16 (internal pages 2405 to 2410) are the full text of *Yuan-III*, and internal page 2405 shows the title, authors, and abstract, and indicates the manuscript was received on "9 October 1992; accepted for publication 3 May 1993." The bottom of the page shows this article appears in a journal whose ISSN is "0021-8979" and has a "1993" copyright date with the American Institute of Physics as the copyright holder. **Ex. 1013** shows *Yuan-III* has a total of six pages, including eight figures and 14 references.

110. **Ex. 1013** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Yuan-III* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my opinion that **Ex. 1013** is an authentic copy of *Yuan-III* and I see no reason to question its authenticity.

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B. University of Wisconsin-Madison Library Records

111. To determine when *Yuan-III* became publicly accessible I searched the online catalog of the University of Wisconsin-Madison Library System for records for the journal containing this article. **Appendix 1013A** is a true and correct copy of the bibliographic and MARC records for *Journal of Applied Physics*. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions. I used screen captures to produce this appendix.

112. Pages 1 to 4 of **Appendix 1013A** are the bibliographic record for *Journal of Applied Physics* that shows the title, format, language, contributors, publisher, publication date, ISSN, and OCLC number of this journal record. The "Science Libraries Shelving Facility" on page 2 shows the library holdings includes volume 74, number 4 that contains *Yuan-III*.

113. Pages 5 to 8 are the MARC record for *Journal of Applied Physics*. The first six digits of Field 008 show this record was created on "751101" (*i.e.*, November 1, 1975), and the "c19379999" code following the record creation date indicates the journal is an ongoing publication that began publication in 1937 and has no end date of publication. Subfield "a" of Field 040 shows "MUL" (the Minnesota Union List) created the original MARC serial record, and Field 049

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shows “GZM” (the OCLC symbol for the University of Wisconsin-Madison) holds this journal.

114. Field 022 shows “0021-8979” as the ISSN of this journal and Field 035 shows “01754449” as the OCLC number for this record. Field 245 shows the journal title. Field 260 shows the publisher has published this journal since 1937. Field 362 shows the journal began publication in January 1937, and Field 321 shows “Monthly” was the publication frequency of this journal between 1937 and 1983. Field 550 shows this journal is published “in cooperation with the American Physical Society.” Fields 710 show the American Institute of Physics and the American Physical Society are included in the MARC serial record to help users discover this journal.

115. Subjects are represented in Field 050 by a Library of Congress Classification (LCC) number of “QC1” that represents periodicals on physics, and in Field 082 by a Dewey Decimal Classification (DDC) number of 530.5 that represents periodicals on physics. Subject is also represented in Field 650 by a Library of Congress subject heading, with “Physics” as the main topic, followed by a form subheading “Periodicals” to indicate this publication is a periodical on physics. The classification numbers and the subject heading support users to conduct subject searches to discover this journal.

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116. This MARC record (**Appendix 1013A**) shows that *Journal of Applied Physics* is a long-running journal, and the MARC serial record has made it discoverable at the University of Wisconsin-Madison Library System. The date stamp on **Ex. 1013** shows the issue containing *Yuan-III* was received by the library system on August 18, 1993, so the journal record would have been discoverable by at least August 1993 at the library's catalog. Users would have been able to conduct subject searches by the LCC number, the DDC number, and the Library of Congress subject heading in the MARC record to discover this journal. They would also have been able to search for this journal by the ISSN, title, and the two organizations involved in the publication of this journal.

117. The date stamp on the library copy of *Yuan-III* (**Ex. 1013**) shows the issue containing *Yuan-III* was received on "AUG 18 1993." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access, usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Yuan-III* would have become publicly accessible no later than August 25, 1993.

C. Usage Record

118. Actual usage of a publication is reflected by other publications that make reference to it. I used Google Scholar to compile a list of five citations to *Yuan-*

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III that were published from 1996 and 2002 to demonstrate usage (**Appendix 1013B**). The earliest citation appeared in April 1996.

D. Summary of My Opinion on *Yuan-III*

119. **Ex. 1013** is authentic because *Yuan-III* appears in a journal published by an authoritative body (in cooperation with the American Physical Society), and the journal issue is held by the University of Wisconsin-Madison Library System. The article itself contains no signs of alterations and raises no suspicion of its authenticity. The MARC serial record of this library system (**Appendix 1013A**) and the date stamp inform my opinion that this journal would have been discoverable at the library's catalog by August 1993. The date stamp on **Ex. 1013** shows the issue containing *Yuan-III* was received by the library on August 18, 1993. It is therefore my opinion that *Yuan-III* would have been publicly accessible by August 25, 1993. Citation record shows the earliest citation appeared in April 1996.

XI. Authenticity and Public Availability of *Wang-2000* (Ex. 1014)

A. Authentication

120. **Exhibit 1014** is a true and correct copy of "Laser Induced Thin Film Spallation," ("*Wang-2000*"), by Wang et al., known as TAM Report 944, UILU-ENG-2000-6019, Theoretical and Applied Mechanics Department, University of Illinois Urbana-Champaign. When I began researching this report, I searched Google Scholar for information, and a record for this work led me to an archived copy of

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TAM Report 944 at https://www.ideals.illinois.edu/items/120535 in the institutional repository at the University of Illinois at Urbana-Champaign. This copy is presented as **Ex. 1014** in this declaration.

121. Page 1 shows the title, authors, and abstract. **Ex. 1014** shows *Wang-2000* has a total of 44 pages, including 21 figures, 25 equations, five tables (there are two Table 2), two appendices, and 29 references.

122. **Ex. 1014** is in a condition that creates no suspicion about its authenticity. Specifically, the text of *Wang-2000* appears to flow seamlessly, and there are no visible alterations to the page. In addition, **Ex. 1014** is obtained from the institutional repository of the university where the report was completed. Based on my analysis, it is my opinion that **Ex. 1014** is an authentic copy of *Wang-2000* and I see no reason to question its authenticity.

B. Internet Archive Record

123. To determine when *Wang-2000* became publicly accessible I searched the Internet Archive for records. **Appendix 1014A** is a true and correct copy of the webpage for "2000 TAM Reports" archived by Internet Archive. I personally located, identified, and obtained this record. This is the type of record experts in my field would reasonably rely upon when forming their opinions.

124. Page 1 is a screen capture of a Wayback Machine calendar that shows the original webpage

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(http://www.tam.uiuc.edu/Pubs/TAM_Reports/2000/index.html) was archived once by Internet Archive, and this particular copy was archived on "JAN 22 2001" and has been available at https://web.archive.org/web/20010122062100/http://www.tam.uiuc.edu/Pubs/TAM_Reports/2000/index.html since then.

125. Internet Archive is a digital library that archives scholarly materials, cultural artifacts, and other web resources on the Internet and provides the public with free access to its collections. I have used the Internet Archive in the past and am familiar with their practice of assigning an extended URL to an archived resource in the format of http://www.archive.org/web/[Year in yyyy][Month in mm][Day in dd][Time code in hh:mm:ss]/[Archived URL] to show the point of time the archived file was captured. The URL of this archived copy shows this file was archived on "20010122062100" (i.e., January 22, 2001, at 6 a.m., 21 minutes, and 0 seconds). Because Internet Archive does not usually archive web resources as soon as they appear on the Internet, the archive date is not the first public availability date of an archived resource. Furthermore, a web resource will need to be available on the Internet before it can be archived. For these reasons, the archive date in the extended URL means that an archived copy of a web resource was available before, and definitely no later than the archive date. It is therefore my opinion that this archived

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copy of the 2000 TAM Reports would have been publicly available no later than January 22, 2001.

126. Pages 2 to 4 are the PDF of this archived copy of a list of the 2000 TAM Reports of the Department of Theoretical and Applied Mechanics. The list has four columns, including the report number, authors, title, and publication date. Report 944 by Wang, Sottos and Weaver is listed on page 3 with a "May 2000" publication date. The report number is a hyperlink for users to access the document. Internet Archive did not archive Report 944. Nevertheless, by January 22, 2001, users would have been able to discover this webpage on the 2000 TAM Reports to become aware of Report 944. The end of this webpage shows this webpage was last "updated 11 October 2000" and that means this webpage would have been on the Internet by October 11, 2000.

C. Summary of My Opinion on Wang-2000

127. **Ex. 1014** is authentic because it is in the institutional repository of the academic institution where the report was completed, and the document itself shows no signs of alteration. Based on the information presented by **Appendix 1014A**, it is my opinion that *Wang-2000*, which is TAM Report 944, would have been publicly accessible as early as October 11, 2000, and definitely no later than January 22, 2001.

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XII. Authenticity and Public Availability of *Wang-2001* (Ex. 1015)

A. Authentication

128. **Exhibit 1015** is a true and correct copy of "Laser-induced weak shock in fused silica for destructive testing of thin films," ("*Wang-2001*"), by Wang and Weaver, *Journal of the Acoustical Society of America*, 109(5_Supplement), p. 2308, that I obtained from Linda Hall Library. When I began researching this article, I searched WorldCat for libraries holding the journal containing *Wang-2001*, and located a record (https://search.worldcat.org/title/1226792) that showed Linda Hall Library is one of the holding libraries of this journal. After verifying the holdings information in their online catalog, I obtained a scan copy of *Wang-2001* from Linda Hall Library through a document vendor. This library copy is presented as **Ex. 1015** in this declaration.

129. Page 1 is internal page 2308 that shows *Wang-2001* is listed under 2:00 and identified as "1pPA5" and the abstract is noted as about a work supported by NSF. The bottom of the page identifies the journal issue as vol. 109, no. 5, pt 2 (May 2001) of *The Journal of Acoustical Society of America* that covers the 141st meeting of the Acoustical Society of America. Page 2 is the issue cover that shows the name, location, and date of the 141st Meeting, and also shows the issue was published "by the Acoustical Society of America through the American Institute of Physics." The cover carries a date stamp of "Linda Hall Library May 31 2001" indicating the

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library received this issue on May 31, 2001. Page 3 is the publication information page that shows "0001-4966" as the ISSN of this journal, and "JASMAN" as its CODEN. It also shows this issue has a "2001" copyright date and the Acoustical Society of America is the copyright holder. Page 4 is the table of contents that shows abstracts of presentations at "Technical Sessions (1p___), Monday Afternoon" begins on page 2302.

130. **Ex. 1015** is in a condition that creates no suspicion about its authenticity. Specifically, the text of *Wang-2001* appears to flow seamlessly, and there are no visible alterations to the page. Based on my analysis, it is my opinion that **Ex. 1015** is an authentic copy of *Wang-2001* and I see no reason to question its authenticity.

B. Linda Hall Library Records

131. To determine when *Wang-2001* became publicly accessible I searched the online catalog of the Linda Hall Library for records for the journal containing this article. **Appendix 1015A** is a true and correct copy of the bibliographic and MARC records for *The Journal of the Acoustical Society of America*. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions. I used screen captures to produce this appendix.

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132. Pages 1 to 4 of **Appendix 1015A** are the bibliographic record for the journal containing *Wang-2001*. Pages 1 and 2 show the journal is available at Linda Hall Library Closed Stacks – Serials, and the library holds the volume that contains Wang-2001. Pages 3 and 4 show bibliographical details, including title, other title, creator and contributor, identifiers, related titles, publisher, creation date, general notes, and citations note.

133. Pages 5 and 6 are the MARC record. The first six digits of Field 008 show the record was created on "750320" (*i.e.*, March 20, 1975), and the code of "c19299999" following the record creation date indicates the journal is a continuing resource that began publication in 1929 and has no end date for publication. Subfield "a" of Field 040 shows "NLM" (the OCLC symbol for the National Library of Medicine) created the original MARC serial record, and Field 049 shows "LHL" (the OCLC symbol for Linda Hall Library) holds this journal.

134. Field 022 shows "0001-4966" as the ISSN of this journal and Field 035 shows "1226792" as the OCLC number for this record. Field 245 shows the journal title. Field 260 shows the publisher. Field 362 shows the journal began publication with vol. 1 in October 1929. Field 710 show the Acoustical Society of America is included in the MARC serial record to help users discover this journal.

135. This MARC record (**Appendix 1015A**) shows that The Journal of the Acoustical Society of America is a long-running journal, and the MARC serial

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record has made it discoverable at Linda Hall Library. The date stamp on **Ex. 1015** shows the issue containing *Wang-2001* was received by the library system on May 31, 2001, so it is my opinion that this journal would have been discoverable in the library's catalog by at least May 2001. Users would have been able to search for this journal by the ISSN, title, and the Acoustical Society of America to discover this journal.

136. The date stamp on the library copy of *Wang-2001* (**Ex. 1015**) shows the issue containing *Wang-2001* was received on "MAY 31 2001." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access, usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Wang-2001* would have become publicly accessible no later than June 7, 2001.

C. Summary of My Opinion on *Wang-2001*

137. **Ex. 1015** is authentic because *Wang-2001* shows no signs of alterations and raises no suspicion about its authenticity. The MARC serial record of Linda Hall Library (**Appendix 1015A**) and the date stamp inform my opinion that this journal would have been discoverable at the library's catalog by May 2001. The date stamp on **Ex. 1015** shows the issue containing *Wang-2001* was received by the library on

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May 31, 2001. It is therefore my opinion that *Wang-2001* would have been publicly accessible by June 7, 2001.

XIII. Authenticity and Public Availability of *Wang-Parametric* (Ex. 1016)

A. Authentication

138. **Exhibit 1016** is a true and correct copy of "A parametric study of laser induced thin film spallation," ("*Wang-Parametric*"), by Wang et al., *Experimental Mechanics*, 42(1), 74-83, that I obtained from the University of Wisconsin-Madison Library System. When I began researching this article, I searched WorldCat for libraries holding the journal containing *Wang-Parametric*, and located a record (https://search.worldcat.org/title/1568641) that showed this library system was one of the holding libraries. After verifying the holdings information in their online catalog, I obtained a scan copy of *Wang-Parametric* from this library through a document vendor. This library copy is presented as **Ex. 1016** in this declaration.

139. Page 2 of **Ex. 1016** shows the cover that identifies this publication as volume 42, number 1 of *Experimental Mechanics* that has a March 2002 issue date. This page shows Sage Science Press as the publisher and indicates this journal is an international journal of the Society for Experimental Mechanics, Inc. The cover includes the table of contents that shows *Wang-Parametric* begins on page 74. Page 3 is the publication information page that shows the "00144851" as the ISSN of this journal and indicates it is published quarterly. Page 4 is internal page 1 that shows a

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date stamp of "Kurt F. Wendt Lib, College of Engineering APR 01 2002 Madison WI" indicating the library received this issue on April 1, 2002. Pages 5 to 14 (internal pages 74 to 83) show the full text of *Wang-Parametric*. Page 5 shows the title, authors, abstract, and keywords, and indicates the final manuscript was received by the journal on "September 10, 2001." **Ex. 1016** shows *Wang-Parametric* has a total of 10 pages, including three tables, 10 equations, 12 figures, and 38 references.

140. **Ex. 1016** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Wang-Parametric* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my opinion that **Ex. 1016** is an authentic copy of *Wang-Parametric* and I see no reason to question its authenticity.

B. University of Wisconsin-Madison Library Records

141. To determine when *Wang-Parametric* became publicly accessible I searched the online catalog of the University of Wisconsin-Madison Library System for records for the journal containing this article. **Appendix 1016A** is a true and correct copy of the bibliographic and MARC records for *Experimental Mechanics*. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions.

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142. Pages 1 to 3 of **Appendix 1016A** are the bibliographic record for *Experimental Mechanics* that shows the title, language, contributors, publication date, ISSNs, OCLC numbers. The holdings area shows the library has volume 42, number 1 that contains *Wang-Parametric*.

143. Pages 4 to 7 are the MARC record. The first six digits of Field 008 show this record was created on "750824" (*i.e.*, August 24, 1975), and the "c19619999" code following the record creation date indicates the journal is an ongoing publication that began publication in 1961 and has no end date of publication. Subfield "a" of Field 040 shows "MUL" (the Minnesota Union List) created the original MARC serial record, and subfield "d" shows "GZM" (the OCLC symbol for the University of Wisconsin-Madison library) modified the original record later.

144. Field 022 shows "0014-4851" as the ISSN of this journal, and Field 035 shows "1568641" as the OCLC number for this record. Field 245 shows the journal title. Field 260 shows the journal has had several publishers and Sage Science Press has published the journal for the Society for Experimental Mechanics since 1997. Field 362 shows the journal began publication in January 1961, and Field 321 shows "Quarterly" was the publication frequency of this journal between 1983 and December 2003. Field 550 shows the Society for Experimental Stress Analysis was the issuing agency from 1961 to 1984 and the Society for Experimental Mechanics

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has been the issuing agency since 1985. Fields 710 show these two agencies are included in the MARC record to help users discover this journal.

145. Subjects are represented in Fields 650 by two Library of Congress subject headings, with "Materials $x Testing" ("$x" indicates a topical subheading) and "Mechanics, Applied" as the main topics, each followed by a form subheading "Periodicals" to indicate this publication is a periodical on those two topics. The subject heading support users to conduct subject searches to discover this journal.

146. This MARC record (**Appendix 1016A**) shows that *Experimental Mechanics* is a long-running journal, and the MARC serial record has made it discoverable at the University of Wisconsin-Madison Libraries. Users would have been able to conduct subject searches the Library of Congress subject headings in the MARC record to discover this journal. They would also have been able to search for this journal by the ISSN, title, and the issuing bodies of this journal.

147. The date stamp on the library copy of *Wang-Parametric* (**Ex. 1016**) shows the issue containing *Wang-Parametric* was received on "APR 01 2002." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access, usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Wang-Parametric* would have become publicly

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accessible no later than April 8, 2002, at the engineering library of the University of Wisconsin-Madison.

C. Summary of My Opinion on *Wang-Parametric*

148. **Ex. 1016** is authentic because *Wang-Parametric* appears in a journal issued by a scholarly society, and the journal issue is held by the University of Wisconsin-Madison Library System. The article itself contains no signs of alterations and raises no suspicion about its authenticity. The MARC serial record (**Appendix 1016A**) and the date stamp on the issue containing *Wang-Parametric* inform my opinion that the journal was discoverable at the library system no later than April 2002. The date stamp on **Ex. 1016** shows the issue containing *Wang-Parametric* was received by the library on April 1, 2002. It is therefore my opinion that *Wang-Parametric* would have been publicly accessible by April 8, 2002.

XIV. Authenticity and Public Availability of *Wang-TAM* (Ex. 1017)

A. Authentication

149. **Exhibit 1017** is a true and correct copy of "Thin film adhesion measurement by laser induced stress waves," ("*Wang-TAM*"), by Wang et al., known as TAM Report 1019, Theoretical and Applied Mechanics Department, University of Illinois Urbana-Champaign. When I began researching this report, I searched Google Scholar for information, and a record for this work led me to an archived copy of TAM Report 1019 at https://www.ideals.illinois.edu/items/308 the

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institutional repository of the University of Illinois at Urbana-Champaign. This copy is presented as **Ex. 1017** in this declaration.

150. Page 1 shows the title, authors, abstract, and keywords, and a foot note indicates the manuscript was "[s]submitted for publication in Journal of the Mechanics and Physics of Solids (2003)." **Ex. 1017** shows *Wang-TAM* has a total of 32 pages, including 31 equations, 10 figures, 4 tables, and 47 references. A list of recent TAM Reports followed page 28, including the 944 entry that shows "Laser induced thin film spallation" (May 2000), presented as **Ex. 1014** earlier in this declaration, was submitted to *Experimental Mechanics*.

151. **Ex. 1017** is in a condition that creates no suspicion about its authenticity. Specifically, the text of *Wang-TAM* appears to flow seamlessly, and there are no visible alterations to the page. In addition, **Ex. 1017** is obtained from the institutional repository of the university where the report was completed. Based on my analysis, it is my opinion that **Ex. 1017** is an authentic copy of *Wang-TAM* and I see no reason to question its authenticity.

B. Internet Archive Record

152. To determine when *Wang-TAM* became publicly accessible I searched the Internet Archive for records. **Appendix 1017A** is a true and correct copy of the webpage for TAM Reports of 2003 archived by Internet Archive. I personally

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located, identified, and obtained this record. This is the type of record experts in my field would reasonably rely upon when forming their opinions.

153. Page 1 is a screen capture of a Wayback Machine calendar that shows the original webpage (http://www.tam.uiuc.edu/cgi/publications/tam_reports.pl?year=2003) was archived ten times between "17 Apr 2003" and "24 Aug 2004" by Internet Archive, and this particular copy was archived on "JUL 07 2003" and is available at https://web.archive.org/web/20030707174637/http://www.tam.uiuc.edu/cgi/publications/tam_reports.pl?year=2003.

154. Internet Archive is a digital library that archives scholarly materials, cultural artifacts, and other web resources on the Internet and provides the public with free access to its collections. I have used the Internet Archive in the past and am familiar with their practice of assigning an extended URL to an archived resource in the format of http://www.archive.org/web/[Year in yyyy][Month in mm][Day in dd][Time code in hh:mm:ss]/[Archived URL] to show the point of time the archived file was captured. The URL of this archived copy shows this file was archived on "20030707174637" (i.e., July 7, 2003, at 5 p.m., 46 minutes, 37 seconds). Because Internet Archive does not usually archive web resources as soon as they appear on the Internet, the archive date is not the first public availability date of an archived resource. Furthermore, a web resource will need to be available on the Internet

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before it can be archived. For these reasons, the archive date in the extended URL means that an archived copy of a web resource was available before, and definitely no later than the archive date. It is therefore my opinion that this archived copy of the 2003 TAM Reports would have been publicly available no later than July 7, 2003.

155. Pages 2 and 3 are the PDF of this archived copy of a list of the 2003 TAM Reports of the Department of Theoretical and Applied Mechanics. The list has Five columns, including the report number, authors, title, report completion date, and abstract and submission history. Report 1019 by Wang, Sottos and Weaver is listed on page 2 with an "April 2003" completion date. The entry has a hyperlink to the abstract and a note that the manuscript was "submitted to Journal of the Mechanics and Physics of Solids (2003)."

156. The abstract link leads to an abstract archived on September 18, 2003, and available at https://web.archive.org/web/20030918235816/http://www.tam.uiuc.edu/cgi/publications/display_abstract.pl?publication_id=4493. A screen capture of this archived copy is included as page 4 of **Appendix 1017A**. The PDF from this archived abstract leads to a copy of Wang-TAM archived by Internet Archive on May 4, 2004, and has been available at https://web.archive.org/web/20040504234423/http://www.tam.uiuc.edu/publicatio

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ns/tam_reports/2003/1019.pdf since. A screen capture of this archived article is included as page 5 of **Appendix 1017A**.

C. Summary of My Opinion on *Wang-TAM*

157. **Ex. 1017** is authentic because it is in the institutional repository of the academic institution where the report was completed, and the document itself shows no signs of alteration. Based on the information presented by **Appendix 1017A**, it is my opinion that *Wang-TAM*, which is TAM Report 1019, would have been publicly accessible by July 7, 2003, and definitely no later than May 4, 2004, when Internet Archive archived *Wang-TAM*.

XV. Authenticity and Public Availability of *Wang-2003* (Ex. 1018)

A. Authentication

158. **Exhibit 1018** is a true and correct copy of "Laser-induced decompression shock development in fused silica," ("*Wang-2003*"), by Wang et al., *Journal of Applied Physics*, 93(12), 9529-9536, that I obtained from the University of Wisconsin-Madison Library System. When I began researching this article, I searched WorldCat for libraries holding the journal containing *Wang-2003*, and located a record (https://search.worldcat.org/title/1754449) that showed the University of Wisconsin-Madison Library System held this journal. After verifying the holdings information in their online catalog, I obtained a scan copy of *Wang-*

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2003 from this library through a document vendor. This library copy is presented as **Ex. 1018** in this declaration.

159. Page 2 of **Ex. 1018** shows the cover that identifies this issue as volume 93, number 12 (15 June 2003) of *Journal of Applied Physics* and shows the American Institute of Physics as the publisher. Page 3 is the publisher information page that shows this journal's ISSN is "0021-8979," its CODEN is "JAPIAU" and the journal is published semimonthly. Pages 4 to 9 are the table of contents of this issue, and page 4 shows a date stamp of "JUN 12 2003" indicating this issue was received by the library on that date. Pages 10 to 17 (internal pages 9529 to 9536) are the full text of Wang-2003, and internal page 9529 shows the title, authors, and abstract, and indicates the manuscript was received on "15 January 2003; accepted 20 March 2003." The bottom of the page shows this article appears in a journal whose ISSN is "0021-8979" and has a "2003" copyright date with the American Institute of Physics as the copyright holder. **Ex. 1018** shows *Wang-2003* has a total of eight pages, 29 equations, 10 figures and 15 references.

160. **Ex. 1018** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Wang-2003* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my

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opinion that **Ex. 1018** is an authentic copy of *Wang-2003* and I see no reason to question its authenticity.

B. University of Wisconsin-Madison Library Records

161. To determine when *Wang-2003* became publicly accessible I searched the online catalog of the University of Wisconsin-Madison Library System for records for the journal containing this article. **Appendix 1018A** is a true and correct copy of the bibliographic and MARC records for *Journal of Applied Physics*. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions. I used screen captures to produce this appendix.

162. Pages 1 to 4 of **Appendix 1018A** are the bibliographic record for *Journal of Applied Physics* that shows the title, format, language, contributors, publisher, publication date, ISSN, and OCLC number of this journal record. The "Science Libraries Shelving Facility" on page 2 shows the library holdings includes volume 93, number 12 that contains *Wang-2003*.

163. Pages 5 to 8 are the MARC record for *Journal of Applied Physics*. The first six digits of Field 008 show this record was created on "751101" (i.e., November 1, 1975), and the "c19379999" code following the record creation date indicates the journal is an ongoing publication that began publication in 1937 and has no end date of publication. Subfield "a" of Field 040 shows "MUL" (the

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Minnesota Union List) created the original MARC serial record, and Field 049 shows "GZM" (the OCLC symbol for the University of Wisconsin-Madison) holds this journal.

164. Field 022 shows "0021-8979" as the ISSN of this journal and Field 035 shows "01754449" as the OCLC number for this record. Field 245 shows the journal title. Field 260 shows the publisher has published this journal since 1937. Field 362 shows the journal began publication in January 1937, and Field 321 shows "Monthly" was the publication frequency of this journal between 1937 and 1983. Field 550 shows this journal is published "in cooperation with the American Physical Society." Fields 710 show the American Institute of Physics and the American Physical Society are included in the MARC serial record to help users discover this journal.

165. Subjects are represented in Field 050 by a Library of Congress Classification (LCC) number of "QC1" that represents periodicals on physics, and in Field 082 by a Dewey Decimal Classification (DDC) number of 530.5 that represents periodicals on physics. Subject is also represented in Field 650 by a Library of Congress subject heading, with "Physics" as the main topic, followed by a form subheading "Periodicals" to indicate this publication is a periodical on physics. The classification numbers and the subject heading support users to conduct subject searches to discover this journal.

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166. This MARC record (**Appendix 1018A**) shows that *Journal of Applied Physics* is a long-running journal, and the MARC serial record has made it discoverable at the University of Wisconsin-Madison Library System. The date stamp on **Ex. 1018** shows the issue containing *Wang-2003* was received by the library system on June 12, 2003, so the journal record would have been discoverable by at least June 2003 at the library's catalog. Users would have been able to conduct subject searches by the LCC number, the DDC number, and the Library of Congress subject heading in the MARC record to discover this journal. They would also have been able to search for this journal by the ISSN, title, and the two organizations involved in the publication of this journal.

167. The date stamp on the library copy of *Wang-2003* (**Ex. 1018**) shows the issue containing *Wang-2003* was received on "JUN 12 2003." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access, usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Wang-2003* would have become publicly accessible no later than June 19, 2003.

C. Summary of My Opinion on *Wang-2003*

168. **Ex. 1018** is authentic because *Wang-2003* appears in a journal published by an authoritative body (in cooperation with the American Physical

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Society), and the journal issue is held by the University of Wisconsin-Madison Library System. The article itself contains no signs of alterations and raises no suspicion of its authenticity. The MARC serial record of this library system (**Appendix 1018A**) and the date stamp inform my opinion that this journal would have been discoverable at the library's catalog by June 2003. The date stamp on **Ex. 1018** shows the issue containing *Wang-2003* was received by the library on June 12, 2003. It is therefore my opinion that *Wang-2003* would have been publicly accessible by June 19, 2003.

XVI. Authenticity and Public Availability of *Gupta-2003* (Ex. 1019)

A. Authentication

169. **Exhibit 1019** is a true and correct copy of "Glass-modified stress waves for adhesion measurement of ultra thin films for device applications," ("*Gupta-2003*"), by Gupta et al., *Journal of the Mechanics and Physics of Solids*, 51(8), 1395-1412, that I obtained from Linda Hall Library. When I began researching this article, I searched WorldCat for libraries holding the journal containing *Gupta-2003*, and located a record (https://search.worldcat.org/title/1782726) that showed Linda Hall Library is one of the holding libraries of this journal. After verifying the holdings information in their online catalog, I obtained a scan copy of *Gupta-2003* from Linda Hall Library through a document vendor. This library copy is presented as **Ex. 1019** in this declaration.

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170. Pages 1 to 18 (internal pages 1395 to 1412) are the full text of *Gupta-2003*, and the first page of this article shows the title, authors, abstract, and indicates the manuscript was received on "13 September 2002; received in revised form 13 February 2003; accepted 31 March 2003." The bottom of this page shows this article appears in a journal whose ISSN is "0022-5096" and has a "2003" copyright date with Elsevier Science Ltd. as the copyright holder. **Ex. 1019** shows *Gupta-2003* has a total of 18 pages, including one equation, three tables, 15 figures and 17 references.

171. Page 19 is the journal title page that carries a date stamp of "Linda Hall Library JUL 10 2003" indicating this issue was received by the library on July 10, 2003. Page 20 is the copyright page that shows this issue has a "2003" copyright date with Elsevier Science Ltd. as the copyright holder. Page 22 is the front cover that identifies this issue as volume 51, number 9 (August 2003) of *Journal of the Mechanics and Physics of Solids*, and its ISSN is 0022-5096. This cover shows a date stamp of "Linda Hall Library JUL 10 2003."

172. **Ex. 1019** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Gupta-2003* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my opinion that **Ex. 1019** is an authentic copy of *Gupta-2003* and I see no reason to question its authenticity.

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B. Linda Hall Library Records

173. To determine when *Gupta-2003* became publicly accessible I searched the online catalog of the Linda Hall Library for records for the journal containing this article. **Appendix 1019A** is a true and correct copy of the bibliographic and MARC records for *Journal of the Mechanics and Physics of Solids*. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions. I used screen captures to produce this appendix.

174. Pages 1 to 3 of **Appendix 1019A** are the bibliographic record for the journal containing *Gupta-2003*. Pages 1 and 2 show the journal is available at Linda Hall Library Closed Stacks – Serials, and the library holds vol. 51 that contains *Gupta-2003*. Page 3 shows bibliographical details, including title, other title, creator and contributor, subjects, identifiers, publisher, creation date, format, general notes and citations note.

175. Pages 4 and 5 are the MARC record. The first six digits of Field 008 show the record was created on "740606" (*i.e.*, June 6, 1974), and the code of "c19529999" following the record creation date indicates the journal is an ongoing publication that began publication in 1952 and has no end date of publication. Subfield "a" of Field 040 shows "DLC" (the OCLC symbol for Library of Congress)

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created the original MARC serial record, and Field 049 shows "LHL" (the OCLC symbol for Linda Hall Library) holds this journal.

176. Field 022 shows "0022-5096" as the ISSN of this journal and Field 035 shows "1782726" as the OCLC number for this record. Field 245 shows the journal title. Field 260 shows the publisher. Field 362 shows the journal began publication in October 1952. Field 500 shows two editors, and Fields 710 show these two editors are included in the MARC serial record to help users discover this journal.

177. Subject is represented in Fields 650 by two Library of Congress subject headings, with "Mechanics, Applied" and "Solids" as the main topics, each followed by a form subheading "Periodicals" to indicate the main topics are treated in a periodical. The original MARC record created by the Library of Congress includes a classification number in Field 050 to represent the subject, but this number is not used at Linda Hall Library because the library arranges journals by title. The subject headings support users to conduct subject searches to discover this journal.

178. This MARC record (**Appendix 1019A**) shows that *Journal of the Mechanics and Physics of Solids* is a long-running journal, and the MARC serial record has made it discoverable at Linda Hall Library. The date stamp on **Ex. 1019** shows the issue containing *Gupta-2003* was received by the library system on July 10, 2003, so it is my opinion that this journal would have been discoverable in the library's online catalog by at least July 2003. Users would have been able to conduct

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subject searches by the Library of Congress subject headings in the MARC record to discover this journal. They would also have been able to search for this journal by the ISSN, title, and the two editors.

179. The date stamp on the library copy of *Gupta-2003* (**Ex. 1019**) shows the issue containing *Gupta-2003* was received on "JUL 10 2003." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access, usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Gupta-2003* would have become publicly accessible no later than July 17, 2003.

C. Summary of My Opinion on *Gupta-2003*

180. **Ex. 1019** is authentic because *Gupta-2003* shows no signs of alterations and raises no suspicion about its authenticity. The MARC serial record of Linda Hall Library (**Appendix 1019A**) and the date stamp inform my opinion that this journal would have been discoverable at the library's catalog by July 2003. The date stamp on **Ex. 1019** shows the issue containing *Gupta-2003* was received by the library on July 10, 2003. It is therefore my opinion that *Gupta-2003* would have been publicly accessible by July 17, 2003.

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XVII. Authenticity and Public Availability of *Fairand* (Ex. 1020)

A. Authentication

181. **Exhibit 1020** is a true and correct copy of "Use of laser generated shocks to improve the properties of metals and alloys," ("*Fairand*"), by Fairand and Clauer, in *Industrial Applications of High Power Laser Technology* (*SPIE Proceedings*, vol. 86), pp. 112-119, that I obtained from Library of Congress. When I began researching this article, I searched WorldCat for libraries holding the conference proceedings containing *Fairand*, and located a record (https://search.worldcat.org/title/3273542) that showed Library of Congress was one of the holding libraries. After verifying the holdings information in their online catalog, I obtained a scan copy of *Fairand* from Library of Congress through a document vendor. This library copy is presented as **Ex. 1020** in this declaration.

182. Page 1 of **Ex. 1020** shows the covers and spine of a bound volume. The front cover shows a call number label of "TA 1673 .I55 Copy 2" and a label of "FT MEADE GenColl" that shows this work is in the general collection at the Fort Meade facility. Page 2 is the cover that shows the title, date and location of the conference, and indicates this work is volume 86 of the proceedings of the Society of Photo-Optical Instrumentation Engineers. Page 3 is the title page that carries a date stamp of "Copyright Office JUN -8 1977 Library of Congress" and page 4 is the copyright page that shows this work has a 1977 copyright date and the Society of Photo-Optical

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Instrumentation Engineers is the copyright holder. It also shows the ISBN (International Standard Book Number) of this work is 0-89252-113-9. This page shows a hand-written call number, and a hand-written number of "77-365507" that appears to be a Library of Congress control number. Pages 5 and 6 are the table of contents and page 6 shows Fairand begins on page 112 and is included in Session 3. Laser Applications in Micromachining, Electronic Fabrication, and Hardening. Pages 7 to 16 are the full text of Fairand. Page 7 (internal page 112) shows the title, authors, and abstract. **Ex. 1020** shows *Fairand* has a total of eight pages, including five figures and 19 references.

183. **Ex. 1020** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Fairand* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my opinion that **Ex. 1020** is an authentic copy of *Fairand* and I see no reason to question its authenticity.

B. Library of Congress Records

184. To determine when *Fairand* became publicly accessible I searched the online catalog of the Library of Congress for records for the conference proceedings containing this article. **Appendix 1020A** is a true and correct copy of the bibliographic and MARC records for *Industrial Applications of High Power Laser*

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Technology. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions.

185. Pages 1 and 2 of **Appendix 1020A** are the bibliographic record that shows the title, publisher, description, ISBN, series title and numbering, and LCCN (Library of Congress control number). The Item Availability area shows the call number of copy 2 and indicates it is stored offsite, and users can request access at the Jefferson or Adams Building Readings Rooms. The Status field shows copy 2 was checked out when I saved the record on March 24, 2024.

186. Pages 3 and 4 are the MARC record. The first six digits of Field 008 show this record was created on "770818" (*i.e.*, August 18, 1977), and the "s1977" code following the record creation date indicates this publication has a single publication date of 1977. Subfield "a" of Field 040 shows "DLC" (the OCLC symbol for Library of Congress) created the original MARC record. Fields 008 and 040 inform my opinion that Library of Congress cataloged the book containing Fairand and created a MARC record for it on August 18, 1977. Based on my experience with the collections at the Library of Congress, a newly cataloged book can take one to three months to become publicly accessible. It is therefore my opinion that *Industrial Applications of High Power Laser Technology* that contains *Fairand* would be discoverable at the catalog of the Library of Congress in August 1977, and the

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physical copy, after processing, would become publicly accessible by November 1977.

187. Field 010 shows "77365507" as the Library of Congress control number, and the number is the same as the hand-written number on the copyright page of **Ex. 1020**. Field 020 shows the ISBN, Field 245 shows the title, subtitle, and statement of responsibility, and Field 260 shows SPIE published this work in 1977. Fields 490 and 830 show this work is volume 86 of the SPIE proceedings series and Field 500 explains this work is "Proceedings of the seminar." Field 700 shows the editor is included in the MARC record. Fields 710 shows two organizations are also included in the record to help users discover this book.

188. Subjects are represented in Field 050 by a Library of Congress Classification (LCC) number of "TA1673" that represents congresses on "Lasers and laser applications" in applied optics and photonics, and in Field 082 by a Dewey Decimal Classification (DDC) number of "621.36/6" that represents "Lasers." Subject is also represented in Field 650 by a Library of Congress subject heading, with "Lasers |x Industrial applications" as the main topic, followed by a form subheading "Congresses" to indicate this work is a conference proceedings about the main topic. The classification numbers and the subject heading support users to conduct subject searches to discover this work.

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189. This MARC record (**Appendix 1020A**) has made the proceedings containing *Fairand* discoverable at the Library of Congress since August 1977 when the MARC record was created. Users would have been able to conduct subject searches by the LCC number, the DDC number, and the Library of Congress subject heading in the MARC record to discover this work. They would also have been able to search for this journal by the LCCN, ISSN, title, series, editor, and the two bodies related to this work.

190. The date stamp on **Ex. 1020** shows the proceedings containing *Fairand* was received on "JUN -8 1977." As discussed earlier, a customary library practice is to process a newly cataloged promptly for access. At the Library of Congress this process can take one to three months, so it is my opinion that *Industrial Applications of High Power Laser Technology* became discoverable at the catalog of Library of Congress in August 1977, and the physical copy, after processing, would have become publicly accessible by November 1977.

C. Usage Record

191. Actual usage of a publication is reflected by other publications that make reference to it. I used Google Scholar to compile a list of four citations to *Fairand* that were published from 1991 to 2002 to demonstrate usage (**Appendix 1020B**). The earliest citation appeared in 1991.

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D. Summary of My Opinion on *Fairand*

192. **Ex. 1020** is authentic because *Fairand* appears in a proceedings published by an authoritative body in this subject area and the proceedings is held by Library of Congress. The article itself contains no signs of alterations and raises no suspicion about its authenticity. The MARC record of the Library of Congress (**Appendix 1020A**) shows the proceedings containing *Fairand* has been discoverable at the library since August 1977. It is therefore my opinion that *Industrial Applications of High Power Laser Technology* (and *Fairand* contained therein) would have been publicly accessible by November 1977. Citation record (**Appendix 1020B**) shows the earliest citation appeared in 1991.

XVIII. Authenticity and Public Availability of *Barker* (Ex. 1021)

A. Authentication

193. **Exhibit 1021** is a true and correct copy of "Shock-wave studies of PMMA, fused silica, and sapphire," ("*Barker*"), by Barker and Hollenbach, *Journal of Applied Physics*, 41(10), 4208-4226, that I obtained from Library of Congress. When I began researching this article, I searched WorldCat for libraries holding the journal containing *Barker*, and located a record (https://search.worldcat.org/title/1754449) that showed Library of Congress was one of the holding libraries. After verifying the holdings information in their online

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catalog, I obtained a scan copy of *Barker* from Library of Congress through a document vendor. This library copy is presented as **Ex. 1021** in this declaration.

194. Page 1 of **Ex. 1021** shows the covers and spine of a bound volume, and the spine identifies this volume as "Journal of Applied Physics 41 Sept.-Oct. 1970" whose call number is "QC1 .J83." Page 2 shows the front cover of volume 41, number 10 of *Journal of Applied Physics* that has a "September 1970" issue date. The cover carries a date stamp of "SEP 30 1970" indicating the issue was received by the library on September 30, 1970. Page 3 shows the publisher page that indicates the journal is "published monthly, except twice in March." Pages 4 and 5 are the table of contents, and page 5 shows *Barker* begins on page 4208. Pages 6 to 24 (internal pages 4208 to 4226) are the full text of *Barker*, and internal page 4208 shows the title, authors, abstract, and indicates the manuscript was received on "3 April 1970." **Ex. 1021** shows *Barker* has a total of 19 pages, including 19 figures, 12 equations, six tables, and 50 references.

195. **Ex. 1021** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Barker* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my opinion that **Ex. 1021** is an authentic copy of *Barker* and I see no reason to question its authenticity.

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B. Library of Congress Records

196. To determine when *Barker* became publicly accessible I searched the online catalog of the Library of Congress for records for the journal containing this article. **Appendix 1021A** is a true and correct copy of the bibliographic and MARC records for *Journal of Applied Physics*. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions.

197. Pages 1 to 6 of **Appendix 1021A** are the bibliographic record for *Journal of Applied Physics* that shows the title, publisher, publication frequency information over the years, ISSN (International Standard Serial Number), LCCN (Library of Congress control number), and CODEN (a six character unique identifier of serials) of this journal. The Item Availability area shows the library holdings, indicating volume 41, number 10 that contains *Barker* is held at this library.

198. Pages 7 to 14 are the MARC record for *Journal of Applied Physics*. The first six digits of Field 008 show this record was created on "751101" (*i.e.*, November 1, 1975), and the "c19379999" code following the record creation date indicates the journal is an ongoing publication that began publication in 1937 and has no end date of publication. Subfield "a" of Field 040 shows "MUL" (the Minnesota Union List) created the original MARC serial record, and subfield "d"

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shows “DLC” (i.e., the OCLC symbol for Library of Congress) modified the record later.

199. Field 022 shows “0021-8979” as the ISSN of this journal and Field 035 shows “01754449” as the OCLC number for this record. Field 245 shows the journal title. Field 260 shows the publisher has published this journal since 1937. Field 362 shows the journal began publication in January 1937, and Field 321 shows “Monthly” was the publication frequency of this journal between 1937 and 1983. Field 550 shows this journal is published “in cooperation with the American Physical Society.” Fields 710 show the American Institute of Physics and the American Physical Society are included in the MARC serial record to help users discover this journal.

200. Subjects are represented in Field 050 by a Library of Congress Classification (LCC) number of “QC1” that represents periodicals on physics, and in Field 082 by a Dewey Decimal Classification (DDC) number of 530.5 that represents periodicals on physics. Subject is also represented in Field 650 by a Library of Congress subject heading, with “Physics” as the main topic, followed by a form subheading “Periodicals” to indicate this publication is a periodical on physics. The classification numbers and the subject heading support users to conduct subject searches to discover this journal.

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201. This MARC record (**Appendix 1021A**) shows that *Journal of Applied Physics* is a long-running journal, and the MARC serial record has made it discoverable at the Library of Congress. The date stamp on **Ex. 1021** shows the issue containing *Barker* was received by the library on September 30, 1970, so the journal record would have been discoverable by at least October 7, 1970, at the library's catalog. Users would have been able to conduct subject searches by the LCC number, the DDC number, and the Library of Congress subject heading in the MARC record to discover this journal. They would also have been able to search for this journal by the ISSN, title, and the two organizations involved in the publication of this journal.

202. The date stamp on the library copy of *Barker* (**Ex. 1021**) shows the issue containing *Barker* was received on "SEP 30 1970." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access, usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Barker* would have become publicly accessible no later than October 7, 1970.

C. Usage Record

203. Actual usage of a publication is reflected by other publications that make reference to it. I used Google Scholar to compile a list of five citations to

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Barker that were published from 1970 and 1971 to demonstrate early usage (**Appendix 1021B**). The earliest citation appeared in December 1970.

D. Summary of My Opinion on *Barker*

204. **Ex. 1021** is authentic because *Barker* appears in a journal published by an authoritative body and the journal issue is held by Library of Congress. The article itself contains no signs of alterations and raises no suspicion of its authenticity. The MARC serial record of the Library of Congress (**Appendix 1021A**) shows the journal has been discoverable at the library, and the "SEP 30 1970" date stamp informs my opinion that this journal would have been discoverable at the library's catalog by September 1970. The date stamp on **Ex. 1021** shows the issue containing *Barker* was received by the library on September 30, 1970. It is therefore my opinion that *Barker* would have been publicly accessible by October 7, 1970. Citation record shows the earliest citation appeared in December 1970.

XIX. Authenticity and Public Availability of *Pronin* (Ex. 1028)

A. Authentication

205. **Ex. 1028** is a true and correct copy of Applications of Laser Generated Stress Pulses for Materials Characterization, ("*Pronin*"), by Alexander Pronin, which is a doctoral dissertation completed in 1995 at Dartmouth College. **Ex. 1028** is a ProQuest copy of this dissertation. This copy is part of a declaration on Pronin I obtained from ProQuest. The ProQuest declaration is discussed further below.

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206. Page 1 of **Ex. 1028** is the "Information to Users" page that states "[t]his manuscript has been reproduced from the microfilm master." Page 3 is the title page that shows the title, author, signatures of the examining committee and the dean of graduate studies, the degree granting institution ("Dartmouth"), and the degree date ("September 1995"). Page 4 shows that the UMI number for this thesis is 9615291, and UMI Microform 3070468 has a 1996 copyright date and UMI Company is the copyright holder. Page 5 shows the abstract and a date of "August 6, 1995." The table of contents begins on internal pages iii. **Ex. 1028** shows *Pronin* includes five chapters, equations, tables, figures, a bibliography and an appendix. The main text ends on internal page 136.

207. "With more than 5 million dissertations and theses, ProQuest Dissertations & Theses Global is the most comprehensive collection of dissertations and theses in the world." As "the official dissertations repository for the Library of Congress. It includes access to international scholarly works from USA, UK to Continental Europe, Africa to India and China" and is "updated weekly and features 24 indexed and searchable fields, including full text searchability for the entire text of full-text dissertations" (source: https://proquest.libguides.com/pqdt/content).

208. The ProQuest copy of *Pronin* (**Ex. 1028**) is in a condition that creates no suspicion about its authenticity. Specifically, the front matter and the body of the text are not missing any intermediate pages, the text on each page appears to flow

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seamlessly from one page to the next, and there are no visible alterations to the document. Moreover, **Ex. 1028** was found in the custody of a database known as the most comprehensive dissertations and theses database, a place where, if authentic, it would likely be found. I therefore see no reason to question the authenticity of this copy of *Pronin*.

B. ProQuest Affidavit on *Pronin*

209. **Ex. 1036** is a true and correct copy of a declaration of Mr. Carl Mageski of ProQuest LLC that I obtained. Paragraph 3 states that before 2013, "[a] 'Record' of each dissertation and each master's thesis submitted to ProQuest was published in ProQuest's print publication Dissertations Abstracts International or Master's Abstracts International, respectively." It further states that a "Record" "consists of an abstract, index record, and citation information including title, author name, degree granting institution and degree date."

210. Paragraph 4 states that starting in 1985 dissertations and theses indexed by ProQuest were searchable in the "Abstract Database which was made available online through third party vendors such as Dialog, Data-Start, and OCLC" and in 1997, "ProQuest made available the contents of the Abstract Database in its ProQuest Digital Dissertations and Theses database ("PQDT"), which is accessible via the world wide web to authenticated subscribers. The Abstract Database allows for text searching of the Records, including the title, author, index terms and the

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abstract." These statements confirm my understanding that the standard practice of ProQuest is to create records for theses and dissertations submitted to ProQuest. While the records were in print earlier, starting in 1985, ProQuest has made their records searchable in the Abstract Database, and starting in 1997, the contents of the Abstract Database became searchable in PQDT. In addition, Paragraph 5 clarifies that "The PQDT database includes the Abstract Database" and "PQDT allows for text searching for the Records as well as full text where the full PDF is properly formatted." This means that after the full PDF is properly formatted, the full text of a thesis becomes searchable.

211. Mr. Mageski states in Paragraph 6 that "At the time of publication of the Dissertation (the full citation is provided in paragraph 9 below), ProQuest published in the Abstract Database a Record of each dissertation and each master's thesis that ProQuest offers for sale" and the record "is available to the students, faculty, staff and/or patrons of any institutions that subscribes to the Abstract Database." Paragraph 9 confirms that "At the time of the Dissertation's publication" (*i.e.*, August 6, 1996, per Paragraph 8), "the Record of the Dissertation was made available directly from ProQuest in electronic format and online via third party vendors."

212. Paragraph 7 further states that "At the time of the Dissertation's publication, the Record and full PDF of the Dissertation was added to PQDT as

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specified below." Paragraph 8 shows that on "08/06/1996" the full text of *Pronin* was received by UMI/ProQuest, and the field for "Date first made available for sale (print or electronic)" shows "08/06/1996" was the date interested users could purchase this dissertation. These statements inform my opinion that the Record and full text of *Pronin* was added to PQDT on August 6, 1996, making *Pronin* discoverable in PQDT from that date on, and the thesis also became available for sale in print and online formats on August 6, 1996.

213. Paragraph 5 clarifies that when the full text of a PDF is properly formatted, the full text becomes searchable. The field for "Date full text is loaded into PQDT" in Paragraph 8 shows that the full text was loaded into PQDT on "07/12/2012" and that means the full text of *Pronin* became searchable in PQDT from that date on.

214. The declaration of Mr. Mageski (**Ex. 1036**) informs my opinion that *Pronin* became discoverable in PQDT on August 6, 1996, and the dissertation became available for sale in print and online formats on the same day. As of August 6, 1996, interested users at institutions that are subscribers to PQDT would be able to search this database to discover *Pronin* and access the dissertation freely.

C. Summary of My Opinion on *Pronin*

215. **Ex. 1028** is authentic because it is a reproduction from the thesis approved by the author's department and doctoral committee, and the reproduction

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is made by ProQuest, a comprehensive and authoritative source of theses and dissertations, after the thesis was submitted to ProQuest. The thesis itself shows no signs of alterations and raises no suspicion about its authenticity. The declaration of Mr. Carl Mageski (**Ex. 1036**) shows that *Pronin* became discoverable in PQDT and also available for sale in print and online formats on August 6, 1996, and the full text of *Pronin* became searchable on July 12, 2012.

XX. Authenticity and Public Availability of *Gupta-1991* (Ex. 1029)

A. Authentication

216. **Exhibit 1029** is a true and correct copy of "Measurement of strength of thin film interfaces by laser spallation experiment," ("*Gupta-1991*"), by Gupta and Argon, in *Inelastic Deformation of Composite Materials: IUTAM Symposium, Troy, New York, May 29–June 1, 1990*, pp. 51-74, edited by George J. Dvorak, Springer New York, that I obtained from Library of Congress. When I began researching this article, I searched WorldCat for libraries holding the conference proceedings containing *Gupta-1991*, and located a record (https://search.worldcat.org/title/23145328) that showed Library of Congress was one of the holding libraries. After verifying the holdings information in their online catalog, I obtained a scan copy of *Gupta-1991* from Library of Congress through a document vendor. This library copy is presented as **Ex. 1029** in this declaration.

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217. Page 1 of **Ex. 1029** shows the covers and spine of the book containing *Gupta-1991*. The front cover shows the conference name, editor, title, and publisher. The spine shows a call number label of "TK 418.9 .C6I533 1991 Copy 2" and a label of "FT MEADE GenColl" that shows this work is in the general collection at the Fort Meade facility. The back cover shows two ISBNs and a Library of Congress barcode. Page 2 is the title page that shows the title, symposium location and date, editor, publisher. Page 3 is the copyright page that shows a 1991 copyright date and Springer Verlag New York Inc. It carries a date stamp of "Library of Congress JAN 16 1991 Copyright Office." It also shows a hand-written call number and a hand-written number of "91-109559" that appears to be a Library of Congress control number. Pages 4 to 7 are the table of contents, and page 4 shows Gupta-1991 is included in "Session 1. Interfaces I" and begins on page 51. Pages 8 to 31 (internal pages [51] to 74) are the full text of *Gupta-1991*. **Ex. 1029** shows *Gupta-1991* has a total of 24 pages, including nine equations, 14 figures, and more than 35 references.

218. **Ex. 1029** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Gupta-1991* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my opinion that **Ex. 1029** is an authentic copy of *Gupta-1991* and I see no reason to question its authenticity.

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B. Library of Congress Records

219. To determine when *Gupta-1991* became publicly accessible I searched the online catalog of the Library of Congress for records for the book containing this article. **Appendix 1029A** is a true and correct copy of the bibliographic and MARC records for *Inelastic Deformation of Composite Materials*. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions.

220. Pages 1 and 2 of **Appendix 1029A** are the bibliographic record that shows the title, publisher, description, ISBNs, and LCCN (Library of Congress control number). The Item Availability area shows the call number of copy 2 and indicates it is stored offsite, and users can request access at the Jefferson or Adams Building Readings Rooms. The Status field shows copy 2 was checked out when I saved the record on March 23, 2024.

221. Pages 3 and 4 are the MARC record. The first six digits of Field 008 show this record was created on "910125" (*i.e.*, January 25, 1991). Field 955 records local cataloging activities and it shows the MARC record was completed on "04-25-91" (*i.e.*, April 25, 1991.) Subfield "a" of Field 040 shows "DLC" (the OCLC symbol for Library of Congress) created the original MARC record. Fields 008, 955, and 040 inform my opinion that Library of Congress cataloged the book containing *Gupta-1991* and created a MARC record for it on January 25, 1991. The MARC

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record was completed on April 25, 1991, and the physical copy was then sent forward for processing. Based on my experience with the collections at the Library of Congress, a newly cataloged book can take one to three months to become publicly accessible. It is therefore my opinion that *Inelastic Deformation of Composite Materials* that contains *Gupta-1991* became discoverable at the catalog of the Library of Congress in January 1991 when the MARC record was created. The record was completed on April 25, 1991, and the physical copy, after processing, would become publicly accessible by July 25, 1991.

222. Field 010 shows "91109559" as the Library of Congress control number, which is the same as the hand-written number on the copyright page of **Ex. 1029**. Fields 020 shows the ISBNs, Field 245 shows the title, subtitle, and statement of responsibility, and Field 260 shows Springer-Verlag published this book in 1991. Field 500 explains the book include papers "presented at the IUTAM Symposium on Inelastic Deformation of Composite Materials." The editor, the International Union of Theoretical and Applied Mechanics, and the symposium name are included in Fields 700, 710, and 711, respectively, to help users discover this books.

223. Subjects are represented in Field 050 by a Library of Congress Classification (LCC) number of "TA418.9.C6" that represents "Composite materials" and in Field 082 by a Dewey Decimal Classification (DDC) number of "620.1/1233" that represents "Permanent deformation (Plasticity)." Subject is also

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represented in Fields 650 by three Library of Congress subject headings, with "Composite materials |x Mechanical properties" ("|x" indicates a topical subheading), "Composite materials |x Testing," and "Elasticity" as the main topics, each followed by a form subheading "Congresses" to indicate this work contains conference proceedings about the three main topics. The classification numbers and the subject heading support users to conduct subject searches to discover this work.

224. This MARC record (**Appendix 1029A**) has made the proceedings containing *Gupta-1991* discoverable at the Library of Congress since January 25, 1991, when the MARC record was created. Users would have been able to conduct subject searches by the LCC number, the DDC number, and the Library of Congress subject headings in the MARC record to discover this work. They would also have been able to search for this book by the LCCN, ISSNs, title, editor, the organization in Field 710, and the conference name.

225. As discussed earlier, a customary library practice is to process a newly cataloged promptly for access. At the Library of Congress this process can take one to three months. Since the MARC record was created on January 25, 1991, and completed on April 25, 1991, it is my opinion that *Inelastic Deformation of Composite Materials* became discoverable at the catalog of Library of Congress in January of 1991, and the physical copy, after processing, would have become publicly accessible by July 25, 1991, three months after the record was completed.

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C. Usage Record

226. Actual usage of a publication is reflected by other publications that make reference to it. I have review citations to *Gupta-1991* on Google Scholar and found a 1992 citation that demonstrates early usage: Lee, Y. J., & Freund, L. B. (1992). Dynamic buckling delamination of a bonded thin film under residual compression. In Advances in Dynamic Systems and Stability: Festschrift for Bruno A. Boley (pp. 147-160). Vienna: Springer Vienna.

D. Summary of My Opinion on *Gupta-1991*

227. **Ex. 1029** is authentic because *Gupta-1991* appears in a proceedings published and the proceedings is held by Library of Congress. *Gupta-1991* contains no signs of alterations and raises no suspicion about its authenticity. The MARC record of the Library of Congress (**Appendix 1029A**) shows the book containing *Gupta-1991* has been discoverable at the library since January 1991. The record was completed on April 25, 1991. It is therefore my opinion that *Inelastic Deformation of Composite Materials* (and *Gupta-1991* contained therein) would have been publicly accessible by July 25, 1991. Citation history of this article on Google Scholar shows the earliest citation appeared in 1992.

XXI. Authenticity and Public Availability of *IMECE2002* (Ex. 1030)

228. **Exhibit 1030** is a true and correct copy of the Onsite Program for ASME International Mechanical Engineering Congress and Exposition, November

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17-22, 2002, New Orleans, Louisiana, ("*IMECE2002*"), that I obtained from Linda Hall Library. When I began researching this program book, I searched Google for information on the conference, and learned that Linda Hall Library had a collection of conference materials related to ASME, so I contacted the library staff to determine if the program book for 2002 ASME IMECE was in the collection. After the program book was located, I requested a scan copy of portions of the program book from the Linda Hall Library Document Delivery Services. This scan copy is presented as **Ex. 1030** in this declaration.

229. **Ex. 1030** includes the front matter of the conference program book (up to internal page 25), pages 110 and 111, and the last page of this publication. Page 1 is the cover that shows this document is the "Onsite Program" for the 2002 ASME International Mechanical Engineering Congress & Exposition that took place from November 17-22, 2002, at New Orleans, Louisiana. The cover carries a library stamp of "Linda Hall Library." Page 3 (internal page 1) is the table of contents, and pages 5 to 10 (internal pages 3 to 8) are the Program in Brief for the conference. Page 11 (internal page 9) shows the "Registration Policies" and policy (1) explains that "Super Pass-Full Conference fee includes admission to all technical sessions, track session, poster sessions, exhibits" and also includes "one (1) CD Conference Proceedings (equivalent of approximately 10 division proceedings)." Policy (2) explains that a CD Conference Proceedings is also included for Super Pass-One Day

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fee. "Publication Sales and Conference CDs" on page 12 (internal page 10) inform conference attendees that "[t]he 1,619 technical papers published as the Proceedings of the 2002 Congress are provided on three CDs. These papers have been organized based on their assigned session number, which identifies the subject matter and the sponsoring Division or Track." This page also informs conference attendees that "Congress CD-ROMs are available on-site. Printed versions of the proceedings will be available in December; these can be purchased after the conference." Similarly, "Proceedings Information" on page 27 (internal page 25) states that "[a]ll fully paid attendees at the 2002 International Mechanical Engineering Congress and Exposition will receive one CD-ROM of their choice with their paid registration." This page also informs conference attendees that print proceedings "will be available post-conference (December 2002)" and they can contact ASME for information and ordering.

230. Page 28 (internal page 110, right column) shows the "AMD-16D: Damage and Failure at Coating Interfaces" track sponsored by the Fracture and Failure Committee of the Applied Mechanics Division and chaired by M. E. Walter. The presentations of this track are listed on internal pages 110 and 111, and page 110 shows "Adhesion Measurement of Ultrathin Multilayers Using Glass-Modified Stress Waves" by V. Gupta and V. Kireev of University of California at Los Angeles was scheduled for presentation at 3:45 pm. Page 111 shows four presentations

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followed the Gupta presentation, including "Measurement of Mixed-Mode Interfacial Failure in Thin Films Using Laser Induced Stress Waves" by Wang et al., of University of Illinois at Urbana-Champaign, scheduled for 4:03 pm.

231. *IMECE2002* (**Ex. 1030**) is authentic because it is in a special collection of ASME conference materials at the Linda Hall Library, and the content of this program book shows that it is indeed the onsite program for the 2002 ASME International Mechanical Engineering Congress and Exposition. *IMECE2002* informs me that, at the time of the conference, conference attendees would receive a CD-ROM of the conference proceedings of their choice, and internal page 110 shows Gupta and Kireev were scheduled to present "Adhesion Measurement of Ultrathin Multilayers Using Glass-Modified Stress Waves" at 3:45 pm on Friday, November 22, 2002. **Ex. 1030** informs my opinion that this program book was available to conference attendees at the time of the conference, and attendees interested in the subject would have known about and/or attended the presentation by Gupta and Kireev on Friday, November 22, 2002.

XXII. Authenticity and Public Availability of *Uehara* (Ex. 1031)

A. Authentication

232. **Exhibit 1031** is a true and correct copy of "Bonding strength of adhesives and surface roughness of joined parts," ("*Uehara*"), by Uehara and Sakurai, *Journal of Materials Processing Technology*, 127(2), 178-181, that I

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obtained from Linda Hall Library. When I began researching this article, I searched WorldCat for libraries holding the journal containing *Uehara*, and located a record (https://search.worldcat.org/title/21058561) that showed Linda Hall Library is one of the holding libraries. After verifying the holdings information in their online catalog, I obtained a scan copy of *Uehara* from Linda Hall Library through a document vendor. This library copy is presented as **Ex. 1031** in this declaration.

233. Pages 1 to 4 (internal pages 178 to 181) are the full text of *Uehara*, and page 1 shows the title, authors, abstract, and keywords. The bottom of the page shows Uehara appears in a journal whose ISSN is 0924-036, and has a 2002 copyright date with Elsevier Science B.V. as the copyright holder. *Uehara* has a total of four pages, including nine figures and three references.

234. Page 5 is the issue cover that identifies this issue as volume 127, issue 2 (September 2002) of *Journal of Materials Processing Technology* whose ISSN is 0924-0136, and Elsevier is the publisher. The cover carries a date stamp of "Linda Hall Library FEB 05 2003" indicating the library received this issue on February 5, 2003. Page 6 is the publication information page. Page 7 is the issue title page that carries the same date stamp as the cover. Page 8 is the copyright page that shows this issue has a 2002 copyright date and Elsevier Science B.V. holds the copyright. Pages 10 and 11 are the table of contents that shows *Uehara* begins on page 178.

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235. **Ex. 1031** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Uehara* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my opinion that **Ex. 1031** is an authentic copy of *Uehara* and I see no reason to question its authenticity.

B. Linda Hall Library Records

236. To determine when *Uehara* became publicly accessible I searched the online catalog of the Linda Hall Library for records for the journal containing this article. **Appendix 1031A** is a true and correct copy of the bibliographic and MARC records for *Journal of Materials Processing Technology*. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions. I used screen captures to produce this appendix.

237. Pages 1 to 3 of **Appendix 1031A** are the bibliographic record for the journal containing *Uehara*. Pages 1 and 2 show the journal is available at Linda Hall Library Closed Stacks – Serials, and the library holds vol. 127, no. 2 that contains *Uehara*. Page 3 shows bibliographical details, including title, other titles, subjects, identifiers, related titles, publisher, creation date, format, and local notes.

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238. Pages 4 and 5 are the MARC record. The first six digits of Field 008 show the record was created on "900213" (*i.e.*, February 13, 1990), and the code of "c19909999" following the record creation date indicates the journal is an ongoing publication that began publication in 1990 and has no end date of publication. Subfield "a" of Field 040 shows "LRU" (the OCLC symbol for Tulane University) created the original MARC serial record.

239. Field 022 shows "0924-0136" as the ISSN of this journal and Field 035 shows "21058561" as the OCLC number for this record. Field 245 shows the journal title. Field 246 shows a variant title, and Field 260 shows the publisher. Field 362 shows the journal began publication with vol. 21, no.1 in January 1990, and Field 310 shows the publication frequency has been "Monthly" since 2000. Subject is represented in Field 650 by a Library of Congress subject heading, with "Metal-work" as the main topic, followed by a form subheading "Periodicals" to indicate this publication is a journal about the main topic. The original MARC record created by the Library of Congress includes a classification number in Field 050 and Field 090 to represent the subject, but this number is not used at Linda Hall Library because the library arranges journals by title. The subject headings support users to conduct subject searches to discover this journal.

240. This MARC record (**Appendix 1031A**) shows that *Journal of Materials Processing Technology* is a long-running journal, and the MARC serial

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record has made it discoverable at Linda Hall Library. The date stamp on **Ex. 1031** shows the issue containing *Uehara* was received by the library on February 5, 2003, so it is my opinion that this journal would have been discoverable in the library's online catalog by at least February 2003. Users would have been able to conduct subject searches by the Library of Congress subject heading. They would also have been able to search for this journal by the ISSN, and title.

241. The date stamp on the library copy of *Uehara* (**Ex. 1031**) shows the issue containing *Uehara* was received on "FEB 05 2003." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access, usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Uehara* would have become publicly accessible no later than February 12, 2003.

C. Elsevier Webpage for *Uehara*

242. When I researched *Uehara* on Google Scholar, a record entry led me to the publisher's webpage for *Uehara* at https://doi.org/10.1016/S0924-0136(02)00122-X. **Appendix 1031B** is a true and correct copy of this webpage. I personally located, identified, and obtained this record. This is the type of material experts in my field would reasonably rely upon when forming their opinions.

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243. Page 1 shows the title, authors, abstract, and keywords of *Uehara* and the journal in which it appears. It also indicates *Uehara* became "[a]vailable online 22 March 2002." The rest of **Appendix 1013B** shows the full text of this article as a webpage, including nine figures and three references. **Appendix 1013B** informs my opinion that *Uehara* was available online on March 22, 2002, and appeared in the print issue of the journal in September 2002, meaning users with access to the online version of the journal would have been able to access *Uehara* from March 22, 2002 on.

D. Summary of My Opinion on *Uehara*

244. **Ex. 1031** is authentic because *Uehara* shows no signs of alterations and raises no suspicion about its authenticity. The MARC serial record of Linda Hall Library (**Appendix 1031A**) and the date stamp inform my opinion that this journal would have been discoverable at the library's catalog by February 2003. The date stamp on **Ex. 1031** shows the issue containing *Uehara* was received by the library on February 5, 2003. It is therefore my opinion that the print version of *Uehara* would have been publicly accessible by February 12, 2003. The publisher's webpage for *Uehara* (**Appendix 1031B**) indicates this article was available online on March 22, 2002, meaning users with access to the online version of this journal would have been able to access Uehara from that date on.

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XXIII. Authenticity and Public Availability of *Yu* (Ex. 1032)

A. Authentication

245. **Exhibit 1032** is a true and correct copy of "Measurement of in situ fiber/matrix interface strength in graphite/epoxy composites," ("*Yu*"), by Yu and Gupta, *Composite Science and Technology*, 58(11), 1827-1837, that I obtained from Linda Hall Library. When I began researching this article, I searched WorldCat for libraries holding the journal containing *Yu*, and located a record (https://search.worldcat.org/title/11723630) that showed Linda Hall Library is one of the holding libraries. After verifying the holdings information in their online catalog, I obtained a scan copy of *Yu* from Linda Hall Library through a document vendor. This library copy is presented as **Ex. 1032** in this declaration.

246. Pages 1 to 11 (internal pages 1827 to 1837) are the full text of *Yu*, and internal page 1827 shows the title, authors, abstract, and keywords. It also shows the manuscript was received on "25 July 1997" and accepted on "11 February 1998." The upper right corner of the page shows *Yu* appears in *Composite Science and Technology* whose ISSN is 0266-3538, and has a 1998 copyright date with Elsevier Science Ltd. as the copyright holder. *Yu* has a total of 11 pages, including 13 figures, four equations, one table, and 30 references.

247. Page 12 is the issue cover that identifies this issue as volume 58, no. 11 (1998) of the journal, and its ISSN is 0266-3538. The cover also shows this is a

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special issue on "Micromechanics of Fibre-Reinforced Composites." Page 14 is the title page that carries a date stamp of "Linda Hall Library DEC 16 1998" and page 15 is the copyright page that shows this issue has a 1998 copyright date and Elsevier Science Ltd. is the copyright holder.

248. **Ex. 1032** is in a condition that creates no suspicion about its authenticity. Specifically, the full text of *Yu* is not missing any intermediate pages, the text on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the pages. Based on my analysis, it is my opinion that **Ex. 1032** is an authentic copy of *Yu* and I see no reason to question its authenticity.

B. Linda Hall Library Records

249. To determine when *Yu* became publicly accessible I searched the online catalog of the Linda Hall Library for records for the journal containing this article. **Appendix 1032A** is a true and correct copy of the bibliographic and MARC records for *Composite Science and Technology*. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions. I used screen captures to produce this appendix.

250. Pages 1 to 3 of **Appendix 1032A** are the bibliographic record for the journal containing *Yu*. Pages 1 and 2 show the journal is available at Linda Hall Library Closed Stacks – Serials, and the library holds vol. 58, no. 11 that contains *Yu*. Pages 2 and 3 show bibliographical details, including title, other titles, subjects,

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identifiers, related titles, publisher, creation date, format, frequency, general notes, and citation notes.

251. Pages 4 and 5 are the MARC record. The first six digits of Field 008 show the record was created on "850222" (*i.e.*, February 22, 1985), and the code of "c19859999" following the record creation date indicates the journal is an ongoing publication that began publication in 1985 and has no end date of publication. Subfield "a" of Field 040 shows "CIT" (the OCLC symbol for California Institute of Technology) created the original MARC serial record, and Field 049 shows "LHL" (the OCLC symbol for Linda Hall Library) is the holding library of this record.

252. Field 022 shows "0266-3538" as the ISSN of this journal and Field 035 shows "11723630" as the OCLC number for this record. Field 245 shows the journal title and Field 260 shows Elsevier Applied Science Publishers has published this journal since 1985. Field 362 shows the journal began with vol. 22, no. 1 and Field 310 shows the publication frequency is four numbers per volume, and three volumes per year. Subject is represented in Fields 650 by two Library of Congress subject headings, with "Composite materials" and "Fibrous composites" as the main topics, each followed by a form subheading "Periodicals" to indicate this publication is a journal about the main topics. The original MARC record includes a classification number in Field 050 to represent the subject, but this number is not used at Linda

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Hall Library because the library arranges journals by title. The subject headings support users to conduct subject searches to discover this journal.

253. This MARC record (**Appendix 1032A**) shows that *Composite Science and Technology* is a long-running journal, and the MARC serial record has made it discoverable at Linda Hall Library. The date stamp on **Ex. 1032** shows the issue containing *Yu* was received by the library on December 16 1998, so it is my opinion that this journal would have been discoverable in the library's online catalog by at least December 1998. Users would have been able to conduct subject searches by the Library of Congress subject headings. They would also have been able to search for this journal by the ISSN, and title.

254. The date stamp on the library copy of *Yu* (**Ex. 1032**) shows the issue containing *Yu* was received on "DEC 16 1998." As discussed earlier, a customary library practice is to place a newly received journal issue through the serial check in process, then process the issue promptly for public access, usually within a week after serial check-in is completed. It is therefore my opinion that the issue containing *Yu* would have become publicly accessible no later than December 23, 1998.

C. Usage Record

255. Actual usage of a publication is reflected by other publications that make reference to it. I used Google Scholar to compile a list of three citations to *Yu*

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that were published from 1999 and 2002 to demonstrate usage (**Appendix 1032B**). The earliest citation appeared in December 1999.

D. Summary of My Opinion on *Yu*

256. **Ex. 1032** is authentic because *Yu* shows no signs of alterations and raises no suspicion about its authenticity. The MARC serial record of Linda Hall Library (**Appendix 1032A**) and the date stamp inform my opinion that this journal would have been discoverable at the library's catalog by December 1998. The date stamp on **Ex. 1032** shows the issue containing *Yu* was received by the library on December 16, 1998. It is therefore my opinion that *Yu* would have been publicly accessible by December 23, 1998.

XXIV. Summary Table of Findings

257. The public availability dates of the exhibits discussed above are summarized in **Table 3**.

XXV. Conclusion

258. I hereby declare that all statements made herein on 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 made under penalty of perjury.

Date: 3-30-2024 Executed: Ingrid Hsieh-Yee

Ingrid Hsieh-Yee, Ph.D.

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Table 1: Exhibits in Hsieh-Yee Declaration

Exhibit No.	Description
1005	Wang, J. (2002, July). Thin-film adhesion measurement by laser-induced stress waves. Doctoral dissertation, University of Illinois, Urbana-Champagne ("*Wang*")
1007	Anderholm, N. C. (1970, February). Laser-generated stress waves, *Applied Physics Letters*, 16(3), 113-115 ("*Anderholm*")
1008	Fox, J. A., & Barr, D. N. (1973, June). Laser-induced shock effects in Plexiglas and 6061-T6 aluminum, *Applied Physics Letters*, 22(11), 594-596 ("*Fox*")
1009	Yang, L. C. (1974, June). Stress waves generated in thin metallic films by a Q-switched ruby laser, *Journal of Applied Physics*, 45(6), 2601-2608 ("*Yang*")
1010	Stephens, A. W., & Vossen, J. L. (1976, January/February). Abstract: Measurement of interfacial bond strength by laser spallation, *Journal of Vacuum Science and Technology*, 13(1), 38-39 ("*Stephens*")
1011	Gupta, V., Argon, A. S., Parks, D. M., & Cornie, J. A. (1992, January). Measurement of interface strength by a laser spallation technique, *Journal of the Mechanics and Physics of Solids*, 40(1), 141-180 ("*Gupta-1992*")
1012	Yuan, J., & Gupta, V. (1993, August). Measurement of interface strength by the modified laser spallation technique. I. Experiment and simulation of the spallation process, *Journal of Applied Physics*, 74(4), 2388-2396 ("*Yuan-I*")
1013	Yuan, J., Gupta, V., & Pronin, A. (1993, August). Measurement of interface strength by the modified laser spallation technique. III. Experimental optimization of the stress pulse, *Journal of Applied Physics*, 74(4), 2405-2410 ("*Yuan-III*")

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Exhibit No.	Description
1014	Wang, J. , Sottos, N. R. , & Weaver, R. L. (2000). "Laser Induced Thin Film Spallation", TAM Technical Reports 944, UILU-ENG-2000-6019, Theoretical and Applied Mechanics Department, University of Illinois Urbana-Champaign ("*Wang-2000*")
1015	Wang, J., & Weaver, R. L. (2001). Laser-induced weak shock in fused silica for destructive testing of thin films, *Journal of the Acoustical Society of America*, 109(5_Supplement), p. 2308, ("*Wang-2001*")
1016	Wang, J., Weaver, R. L., & Sottos, N. R. (2002, March). A parametric study of laser induced thin film spallation. *Experimental Mechanics*, 42(1), 74-83 ("*Wang-2002*")
1017	Wang, J., Sottos, N. R., & Weaver, R. L. (2003). Thin film adhesion measurement by laser induced stress waves, TAM Technical Reports 1019 ("*Wang-TAM*")
1018	Wang, J., Weaver, R. L., & Sottos, N. R. (2003). Laser-induced decompression shock development in fused silica, *Journal of Applied Physics*, 93(12), 9529-9536 ("*Wang-2003*")
1019	Gupta, V., Kireev, V., Tian, J., Yoshida, H., & Akahoshi, H. (2003, August). Glass-modified stress waves for adhesion measurement of ultra thin films for device applications, *Journal of the Mechanics and Physics of Solids*, 51(8), 1395-1412 ("*Gupta-2003*")
1020	Fairand, B. P., & Clauer, A. H. (1976, December). Use of laser generated shocks to improve the properties of metals and alloys, in *Industrial Applications of High Power Laser Technology* (SPIE Vol. 86, pp. 112-121) ("*Fairand*")
1021	Barker, L. M., & Hollenbach, R. E. (1970, September). Shock-wave studies of PMMA, fused silica, and sapphire, *Journal of Applied Physics*, 41(10), 4208-4226 ("*Barker*")
1028	Pronin, A. N. (1995). *Applications of laser generated stress pulses for materials characterization*. Doctoral Dissertation, Dartmouth College.

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Exhibit No.	Description
	("*Pronin*")
1029	Gupta, V., & Argon, A. S. (1991). Measurement of strength of thin film interfaces by laser spallation experiment. In *Inelastic Deformation of Composite Materials: IUTAM Symposium, Troy, New York, May 29–June 1, 1990* (pp. 51-74), edited by George J. Dvorak, Springer New York ("*Gupta-1991*")
1030	Conference Program Book, ASME International Mechanical Engineering Congress and Exposition, November 17-22, 2002, New Orleans, Louisiana, obtained from Linda Hall Library ("*IMECE2002*")
1031	Uehara, K., & Sakurai, M. (2002, September). Bonding strength of adhesives and surface roughness of joined parts, *Journal of Materials Processing Technology*, 127(2), 178-181 ("*Uehara*")
1032	Yu, A., & Gupta, V. (1998, November). Measurement of in situ fiber/matrix interface strength in graphite/epoxy composites, *Composite Science and Technology*, 58(11), 1827-1837 ("*Yu*")
1035	March 15, 2024 Declaration of LaTonya Morris, ProQuest
1036	February 27, 2024 Declaration of Carl Mageski, ProQuest

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Table 2: Appendices in Hsieh-Yee Declaration

Appendix No.	Document details
1007A	Bibliographic and MARC records for *Applied Physics Letters* that contains *Anderholm*, available at https://lccn.loc.gov/64006603 from the online catalog of the Library of Congress
1007B	Citations to *Anderholm*, obtained from Google Scholar
1008A	Bibliographic and MARC records for *Applied Physics Letters* that contains *Fox*, available at https://lccn.loc.gov/64006603 from the online catalog of the Library of Congress
1008B	Citations to *Fox*, obtained from Google Scholar
1009A	Bibliographic and MARC records for *Journal of Applied Physics* that contains *Yang*, available at https://search.library.wisc.edu/catalog/999543173602121 from the online catalog of the University of Wisconsin-Madison
1009B	Citations to *Yang*, obtained from Google Scholar
1010A	Bibliographic and MARC records for *Journal of Vacuum Science Technology* that contains *Stephens*, available at https://catalog.lindahall.org/permalink/01LINDAHALL_INST/19lda7s/alma997983103405961 from the online catalog of the Linda Hall Library
1010B	Citations to *Stephens*, obtained from Google Scholar
1011A	Bibliographic and MARC records for *Journal of the Mechanics and Physics of Solids* that contains *Gupta-1992*, available at https://catalog.lindahall.org/permalink/01LINDAHALL_INST/19lda7s/alma992783073405961 from the online catalog of the Linda Hall Library
1011B	Citations to *Gupta-1992*, obtained from Google Scholar

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Appendix No.	Document details
1012A	Bibliographic and MARC records for *Journal of Applied Physics* that contains *Yuan-I*, available at https://search.library.wisc.edu/catalog/999543173602121 from the online catalog of the University of Wisconsin-Madison
1012B	Citations to *Yuan-I*, obtained from Google Scholar
1013A	Bibliographic and MARC records for *Journal of Applied Physics* that contains *Yuan-III*, available at https://search.library.wisc.edu/catalog/999543173602121 from the online catalog of the University of Wisconsin-Madison
1013B	Citations to *Yuan-III*, obtained from Google Scholar
1014A	The webpage of "2000 TAM Reports" that includes an entry for *Wang-2000*, archived by Internet Archive on Jan. 22, 2001, available at https://web.archive.org/web/20010122062100/http://www.tam.uiuc.edu/Pubs/TAM_Reports/2000/index.html
1015A	Bibliographic and MARC records for *Journal of the Acoustical Society of America* that contains *Wang-2001*, available at https://catalog.lindahall.org/permalink/01LINDAHALL_INST/19lda7s/alma992549263405961 from the online catalog of the Linda Hall Library
1016A	Bibliographic and MARC records for *Experimental Mechanics* that contains *Wang-Parametric*, available at https://search.library.wisc.edu/catalog/999482754702121 from the online catalog of the University of Wisconsin-Madison library system
1017A	The webpage for "2003 TAM Reports" that includes an entry for *Wang-TAM (TAM Report 1019)*, archived by Internet Archive on July 7, 2003, available at https://web.archive.org/web/20030707174637/http://www.tam.uiuc.edu/cgi/publications/tam_reports.pl?year=2003

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Appendix No.	Document details
1018A	Bibliographic and MARC records for *Journal of Applied Physics* that contains *Wang-2003*, available at https://search.library.wisc.edu/catalog/999543173602121 from the online catalog of the University of Wisconsin-Madison
1019A	Bibliographic and MARC records for *Journal of the Mechanics and Physics of Solids* that contains *Gupta-2003*, available at https://catalog.lindahall.org/permalink/01LINDAHALL_INST/19lda7s/alma992783073405961 from the online catalog of the Linda Hall Library
1020A	Bibliographic and MARC records for *Industrial Applications of High Power Laser Technology* that contains *Fairand*, available at https://lccn.loc.gov/77365507 from the online catalog of the Library of Congress
1020B	Citations to *Fairand*, obtained from Google Scholar
1021A	Bibliographic and MARC records for *Journal of Applied Physics* that contains *Barker*, available at https://lccn.loc.gov/33023425 from the online catalog of the Library of Congress
1021B	Citations to *Barker,* obtained from Google Scholar
1029A	Bibliographic and MARC records for *Inelastic Deformation of Composite Materials* that contains *Gupta-1991*, available at https://lccn.loc.gov/91109559 from the online catalog of the Library of Congress
1031A	Bibliographic and MARC records for *Journal of Materials Processing Technology* that contains *Uehara*, available at https://catalog.lindahall.org/permalink/01LINDAHALL_INST/19lda7s/alma993217623405961 from the online catalog of the Linda Hall Library
1031B	Publisher webpage for *Uehara*, available at https://doi.org/10.1016/S0924-0136(02)00122-X

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Appendix No.	Document details
1032A	Bibliographic and MARC records for *Composite Science and Technology* that contains *Yu*, available at https://catalog.lindahall.org/permalink/01LINDAHALL_INST/19lda7s/alma992882723405961 from the online catalog of the Linda Hall Library
1032B	Citations to *Yu*, obtained from Google Scholar
A	CV of Ingrid Hsieh-Yee
B	Understanding MARC Bibliographic

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Table 3: Summary of Findings in Hsieh-Yee Declaration

Exhibit No.	Document Description	Public Availability Date
1005	Wang, J. (2002, July). Thin-film adhesion measurement by laser-induced stress waves. Doctoral dissertation, University of Illinois, Urbana-Champagne ("*Wang*")	3/4/2003
1007	Anderholm, N. C. (1970, February). Laser-generated stress waves, *Applied Physics Letters*, 16(3), 113-115 ("*Anderholm*")	5/5/1970
1008	Fox, J. A., & Barr, D. N. (1973, June). Laser-induced shock effects in Plexiglas and 6061-T6 aluminum, *Applied Physics Letters*, 22(11), 594-596 ("*Fox*")	6/7/1973
1009	Yang, L. C. (1974, June). Stress waves generated in thin metallic films by a Q-switched ruby laser, *Journal of Applied Physics*, 45(6), 2601-2608 ("*Yang*")	6/18/1974
1010	Stephens, A. W., & Vossen, J. L. (1976, January/February). Abstract: Measurement of interfacial bond strength by laser spallation, *Journal of Vacuum Science and Technology*, 13(1), 38-39 ("*Stephens*")	4/13/1976
1011	Gupta, V., Argon, A. S., Parks, D. M., & Cornie, J. A. (1992, January). Measurement of interface strength by a laser spallation technique, *Journal of the Mechanics and Physics of Solids*, 40(1), 141-180 ("*Gupta-1992*")	1/9/1992
1012	Yuan, J., & Gupta, V. (1993, August). Measurement of interface strength by the modified laser spallation technique. I. Experiment and simulation of the spallation process, *Journal of Applied Physics*, 74(4), 2388-2396 ("*Yuan-I*")	8/25/1993

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Exhibit No.	Document Description	Public Availability Date
1013	Yuan, J., Gupta, V., & Pronin, A. (1993, August). Measurement of interface strength by the modified laser spallation technique. III. Experimental optimization of the stress pulse, *Journal of Applied Physics*, 74(4), 2405-2410 ("*Yuan-III*")	8/25/1993
1014	Wang, J. , Sottos, N. R. , & Weaver, R. L. (2000). "Laser Induced Thin Film Spallation", TAM Technical Reports 944, UILU-ENG-2000-6019, Theoretical and Applied Mechanics Department, University of Illinois Urbana-Champaign ("*Wang-2000*")	6/7/2001
1015	Wang, J., & Weaver, R. L. (2001). Laser-induced weak shock in fused silica for destructive testing of thin films, *Journal of the Acoustical Society of America*, 109(5_Supplement), p. 2308, ("*Wang-2001*")	6/7/2001
1016	Wang, J., Weaver, R. L., & Sottos, N. R. (2002, March). A parametric study of laser induced thin film spallation. *Experimental Mechanics*, *42(1)*, 74-83 ("*Wang-2002*")	4/8/2002
1017	Wang, J., Sottos, N. R., & Weaver, R. L. (2003). Thin film adhesion measurement by laser induced stress waves, TAM Technical Reports 1019 ("*Wang-TAM*")	7/7/2003
1018	Wang, J., Weaver, R. L., & Sottos, N. R. (2003). Laser-induced decompression shock development in fused silica, *Journal of Applied Physics*, 93(12), 9529-9536 ("*Wang-2003*")	6/19/2003
1019	Gupta, V., Kireev, V., Tian, J., Yoshida, H., & Akahoshi, H. (2003, August). Glass-modified stress waves for adhesion measurement of ultra thin films for device applications, *Journal of the Mechanics and Physics of Solids*, 51(8), 1395-1412 ("*Gupta-2003*")	7/17/2003

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Exhibit No.	Document Description	Public Availability Date
1020	Fairand, B. P., & Clauer, A. H. (1976, December). Use of laser generated shocks to improve the properties of metals and alloys, in *Industrial Applications of High Power Laser Technology* (SPIE Vol. 86, pp. 112-121) ("*Fairand*")	Nov. 1977
1021	Barker, L. M., & Hollenbach, R. E. (1970, September). Shock-wave studies of PMMA, fused silica, and sapphire, *Journal of Applied Physics*, 41(10), 4208-4226 ("*Barker*")	10/7/1970
1028	Pronin, A. N. (1995). *Applications of laser generated stress pulses for materials characterization*. Doctoral Dissertation, Dartmouth College. ("*Pronin*")	8/6/1996
1029	Gupta, V., & Argon, A. S. (1991). Measurement of strength of thin film interfaces by laser spallation experiment. In *Inelastic Deformation of Composite Materials: IUTAM Symposium, Troy, New York, May 29–June 1, 1990* (pp. 51-74), edited by George J. Dvorak, Springer New York ("*Gupta-1991*")	7/25/1991
1030	Conference Program Book, ASME International Mechanical Engineering Congress and Exposition, November 17-22, 2002, New Orleans, Louisiana, obtained from Linda Hall Library ("*IMECE2002*")	Nov. 2002
1031	Uehara, K., & Sakurai, M. (2002, September). Bonding strength of adhesives and surface roughness of joined parts, *Journal of Materials Processing Technology*, 127(2), 178-181 ("*Uehara*")	3/22/2002 (online) 2/12/2003 (print)
1032	Yu, A., & Gupta, V. (1998, November). Measurement of in situ fiber/matrix interface strength in graphite/epoxy composites, *Composite Science and Technology*, 58(11), 1827-1837 ("*Yu*")	12/23/1998

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Exhibit No.	Document Description	Public Availability Date
1035	March 15, 2024 Declaration of LaTonya Morris, ProQuest	
1036	February 27, 2024 Declaration of Carl Mageski, ProQuest	

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Appendix 1007A

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Jones, E. D. (1971, January). Ultrafast laser-induced stress waves in solids. *Applied Physics Letters*, *18*(1), 33-35.

Yang, L. C., & Menichelli, V. J. (1971, December). Detonation of Insensitive High Explosives by a Q-Switched Ruby Laser. *Applied Physics Letters*, *19*(11), 473-475.

Fairand, B. P., Wilcox, B. A., Gallagher, W. J., & Williams, D. N. (1972, September). Laser shock-induced microstructural and mechanical property changes in 7075 aluminum. *Journal of Applied Physics*, *43*(9), 3893-3895.

O'keefe, J. D., & Skeen, C. H. (1972, November). Laser-induced stress-wave and impulse augmentation. *Applied physics letters*, *21*(10), 464-466.

Felix, M. P., & Ellis, A. T. (1972, December). Stress-pulse propagation in solids: a closer look at dispersion. *Applied Physics Letters*, *21*(11), 532-534.

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v.95:no.23 (2008:Aug.25-2009:Dec.7), v.95:no.25-v.97:no.4 (2009:Dec. 21-2010:July 26), v.97:no.6-v.105:no.19 (2010:Aug.9-2014:Nov.10) v.105:no.21-v.106:no.17 (2014:Nov.24.-2015:Apr.27), v.106:no.20-v. 114:no.5 (2015:May 18-2019:Feb.4), v.114:no.7-v.117:no.18 (2019:Feb. 18-2020:Nov.9), v.117:no.20-v.118:no.5 (2020:Nov.16-2021:Feb.1), v. 118:no.9-v.119:no.9 (2021:Mar.1-2021:Aug.30), v.120-v.121 (2022)

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v.94 (2009:Jan.-2009:June), v.95:no.6 (2009:Aug.)

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Appendix 1008B
Citations to Fox

Source Document

Fox, J. A., & Barr, D. N. (1973, June). Laser-induced shock effects in Plexiglas and 6061-T6 aluminum, *Applied Physics Letters, 22*(11), 594-596, **EX1008** ("*Fox*").

Citations: 1974 – 1975 (in chronological order)

Larson, A. R. (1974, May). *Calculations of laser induced spall in aluminum targets* (No. LA-5619-MS). Los Alamos National Lab.(LANL), Los Alamos, NM (United States).

Fairand, B. P., Clauer, A. H., Jung, R. G., & Wilcox, B. A. (1974, October). Quantitative assessment of laser-induced stress waves generated at confined surfaces. *Applied Physics Letters, 25*(8), 431-433.

Duthler, C. J., & Sparks, M. (1974). 6.4 Extrinsic Absorption in Laser Window Materials. In *Laser Induced Damage in Optical Materials: Proceedings of a Symposium Sponsored by the American Society for Testing and Materials and by the National Bureau of Standards* (Vol. 622, pp. 219-226). US Department of Commerce, National Bureau of Standards.

Gagnier, T. R., Kimball, E. W., Selleck, R. R., & MARTIN MARIETTA AEROSPACE ORLANDO FL. (1975, August). Laser Reliability Prediction. *Final Technical Report*.

Appendix 1009A

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v.71(1992)-v.80(1996)

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Medical Subject Heading

Content Types

Periodicals

periodicals

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Publication Details

INCLUDED TITLE	Journal of applied physics online
FORMAT	Journals, Magazines, Newspapers
LANGUAGE	English
CONTRIBUTORS	American Institute of Physics American Physical Society
PUBLICATION	New York, N.Y. : American Institute of Physics, c1937-
PUBLICATION DATES	Vol. 8, no. 1 (Jan. 1937)-
PHYSICAL DETAILS	volumes : illustrations ; 27-29 cm
ISSNS	1089-7550, 0021-8979
OCLC	ocm35124573, ocm01754449
FINDING AIDS	Author and subject index: v. 53 (1982)-60 (1986). 1 v.; v. 61 (1987)-70 (1991). 1 v.; v. 71 (1992)-80 (1996). 1 v
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Appendix 1009B
Citations to ang

Source Document

ang, L. C. (1974, June). Stress aves generated in thin metallic films by a Q-s itched ruby laser. Journal of Applied Physics, 45(6), 26 1-26 8, **EX1009** (" *ang*").

Citations: 1974 – 1978 (in chronological order)

Fairand, B. P., Clauer, A. H., Jung, R. G., & Wilcox, B. A. (1974, October). Quantitative assessment of laser-induced stress waves generated at confined surfaces. *Applied Physics Letters*, *25*(8), 431-433.

Steverding, B., & Dudel, H. P. (1976, May). Laser-induced shocks and their capability to produce fracture. *ournal of applied physics*, (5), 194 -1945.

Fairand, B. P., & Clauer, A. H. (1976, September). ffect of ater and paint coatings on the magnitude of laser-generated shocks. *Optics Communications*, (4), 588-591.

Ready, J. (1978, February). Laser-produced shocks and their relation to material damage. IEEE Journal of Quantum lectronics, 14(2), 79-84.

Inal, O. T., & Murr, L. E. (1978, April). Laser-shock-induced microstructural changes and a comparison with explosive-shock-induced phenomena in metals: Field-ion and electron microscopic studies. *ournal of Applied Physics*, (4), 2427-2434.

Appendix 1010A



JOURNAL

The Journal of vacuum science and technology

American Institute of Physics.; American Vacuum Society.

1964-1982

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Other title	J. vac. sci. technol. Journal of vacuum science & technology
Creator/Contributor	American Institute of Physics. > American Vacuum Society. >
Subjects	Vacuum technology >
Identifier	ISSN : 0022-5355 OCLC : (OCoLC)1754855
Related title	Contains : Proceedings of the eighth annual Conference on the Physics of Compound Semiconductor Interfaces, 27-29 January 1981, Williamsburg, Virginia > Available in other form: Journal of vacuum science and technology (Online) > Later title : Journal of vacuum science & technology. A, Vacuum, surfaces, and films > Later title : Journal of vacuum science & technology. B, Microelectronics processing and phenomena >

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Publisher	New York, N.Y. : Published for the American Vacuum Society by the American Institute of Physics
	Vol. 1, no. 1 (Sept./Oct. 1964)-v. 21, no. 4 (Nov./Dec. 1982).
Creation date	1964-1982
Format	21 v. : ill. ; 28 cm.
Frequency	8 no. a year, 1982
General notes	Title varies slightly.
	Title from cover.
	Split into: Journal of vacuum science & technology. A, Vacuum, surfaces and films, and: Journal of vacuum science & technology. B, Microelectronics processing and phenomena.
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245     04$aThe Journal of vacuum science and technology.
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Appendix 1010B
Citations to Stephens

Source Document

Stephens, A. W., & Vossen, J. L. (1976, January February). Abstract Measurement of interfacial bond strength by laser spallation. *ournal of acuum Science and Technology*, (1), 38-39, **EX1010** ("*Stephens*")

Citations: 1978 – 1988 (in chronological order)

Mattox, D. M., (1978, January), "Thin-Film Adhesion and Adhesive Failure A Perspective," *Adhesion Measurement of Thin Films Thic Films and Bul Coatings ASTM STP* , K. L. Mittal, d., American Society for Testing and Materials, pp. 54-62.

Mittal, K. L., (1978, January), "Adhesion Measurement Recent Progress, Unsolved Problems, and Prospects," *Adhesion Measurement of Thin Films Thic Films and Bul Coatings ASTM STP* , K. L. Mittal, d., American Society for Testing and Materials, pp. 5-17.

Mittal, K. L., & Kern, W. (1987, January). Selected bibliography on adhesion measurement of films and coatings. *ournal of Adhesion Science and Technology*, (1), 247-262.

Rickerby, D. S. (1988, December). A revie of the methods for the measurement of coating-substrate adhesion. *Surface and coatings technology*, (1-2), 541-557.

Appendix 1011A



JOURNAL

Journal of the mechanics and physics of solids

Hill, Rodney, 1921-2011.; Baldwin, William Marsh.

1952

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Details

Title	Journal of the mechanics and physics of solids
Other title	J. mech. phys. solids Journal of the mechanics and physics of solids
Creator/Contributor	Hill, Rodney, 1921-2011. › Baldwin, William Marsh. ›
Subjects	Mechanics, Applied › Solids ›
Identifier	ISSN : 0022-5096 OCLC : (OCoLC)1782726
Publisher	London, New York, Pergamon Press. v. 1- Oct. 1952-
Creation date	1952
Format	illus., diagrs. 25 cm.
General notes	Editors: Oct. 1952-<Oct. 1955> R. Hill (with W. M. Baldwin, Oct. 1952-Apr. 1954)
Citations/References	Applied science & technology index, Chemical abstracts, Computer & control abstracts, Electrical & electronics abstracts, Engineering index annual (1968), Engineering index bioengineering abstracts, Engineering index energy abstracts, Engineering index monthly (1984), International aerospace abstracts, Mathematical reviews, Metals abstracts, Physics abstracts, World aluminum abstracts, Engineering index monthly, Nuclear science abstracts,

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650     #0$aMechanics, Applied $vPeriodicals.
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700     1#$aHill, Rodney, $d1921-2011.
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Appendix 1011B
Citations to Gupta-1992

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Publication Details

INCLUDED TITLE	Journal of applied physics online
FORMAT	Journals, Magazines, Newspapers
LANGUAGE	English
CONTRIBUTORS	American Institute of Physics American Physical Society
PUBLICATION	New York, N.Y. : American Institute of Physics, c1937-
PUBLICATION DATES	Vol. 8, no. 1 (Jan. 1937)-
PHYSICAL DETAILS	volumes : illustrations ; 27-29 cm
ISSNS	1089-7550, 0021-8979
OCLC	ocm35124573, ocm01754449
FINDING AIDS	Author and subject index: v. 53 (1982)-60 (1986). 1 v.; v. 61 (1987)-70 (1991). 1 v.; v. 71 (1992)-80 (1996). 1 v
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Appendix 1012B
Citations to uan- (1993)

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Publication Details

INCLUDED TITLE	Journal of applied physics online
FORMAT	Journals, Magazines, Newspapers
LANGUAGE	English
CONTRIBUTORS	American Institute of Physics American Physical Society
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PUBLICATION DATES	Vol. 8, no. 1 (Jan. 1937)-
PHYSICAL DETAILS	volumes : illustrations ; 27-29 cm
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Citations: 1996 to 2002 (in chronological order)

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Publisher	New York, etc. American Institute of Physics for the Acoustical Society of America. v. 1- Oct. 1929-
Creation date	1929
General notes	Library also has CD-ROM edition of Vol. 1-16 (1929-1945). V.8(1937)- , includes a continuing bibliography, "Contemporary acoustical literature" (title varies); for 1975-90, of which see part 2 of the Society's Journal. Supplement, v. 57-88. Beginning with 1991 numbered as part 2 of the Aug. issue. Subject and author indexes to this bibliography are included in the Journal's cumulative indexes through 1973. Includes "Program of the ... meeting"; for 1974-90 of which see part 1 of the society's Journal. Supplement, v.55-88. Beginning with v.89 the "Program" is numbered as part 2 of the April and Oct. issues. Supplement to v55-56 and Suppl. n1 to v57- continue the program and abstracts of papers presented at the Society's meetings, previously included in the Jrl. Supplement n2, published only with odd numbered vols. beginning with v57, continues ``References to contemporary papers on acoustics'' previously included in the Jrl. Bd w/parent title.
Citations/References	Applied science & technology index, Computer & control abstracts,

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Citations/References Applied science & technology index,
Computer & control abstracts,
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Physics abstracts. Science abstracts. Series A,
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Abstract bulletin of the Institute of Paper Chemistry,
Annual bibliography of English language and literature,
Biological abstracts,
Chemical abstracts,
CIS abstracts,
Current physics index,
Energy information abstracts,
Energy research abstracts,
Engineering index annual (1968),
Environment abstracts,
GeoRef,
Index medicus,
International aerospace abstracts,
MLA international bibliography of books and articles on the modern languages and literatures (Complete edition),
Psychological abstracts,
Reference sources,
Ship abstracts,

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500     ##$aIncludes "Program of the ... meeting"; for 1974-90 of which see part 1 of the society's Journal. Supplement, v.55-88. Beginnin
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Boeing Ex. 1006, p. 209 of 328
Boeing v. Regents Univ. Cal.

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v.44:no.1(2004:Feb.)-v.44:no.6(2004:Dec.)

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Publication Details

FORMAT	Journals, Magazines, Newspapers

Content Types

Periodicals

Boeing Ex. 1006, p. 213 of 328
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LANGUAGE	English
CONTRIBUTORS	Society for Experimental Mechanics (U.S.) Society for Experimental Stress Analysis
PUBLICATION	Brookfield Center, Conn. : Society for Experimental Stress Analysis, c1961-c1984; Bethel, Conn. : Society for Experimental Mechanics, c1985-c1996; Thousand Oaks, Calif. : Society for Experimental Mechanics by Sage Science Press, c1997-
PUBLICATION DATES	Vol. 1, no. 1 (Jan. 1961)-
PHYSICAL DETAILS	volumes : illustrations ; 29 cm
ISSNS	1741-2765, 0014-4851
OCLC	ocm50409802, ocm01568641
SUCCEEDING TITLES	Experimental techniques

Notes

Chemical abstracts
Also available via World Wide Web; subscription required for access to abstracts and full text.
Some articles reprinted in: Strain-gage and transducer techniques, 1984-

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MARC Bibliographic Record

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321		$aQuarterly,$bMar. 1983-Dec. 2003

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550		$aIssued by the Society for Experimental Stress Analysis 1961-1984, Society for Experimental Mechanics 1985-
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1016	Igor R. Kuznetsov and D. S. Stewart	Burning rate of energetic materials with thermal expansion (PDF)	Mar 2003	Abstract Also submitted to *Combustion and Flame* (2003)
1017	John Dolbow, Eliot Fried, Huidi Ji	Chemically-induced swelling of hydrogels (PDF)	Mar 2003	Abstract Also submitted to *Journal of the Mechanics and Physics of Solids* (2003)
1018	George A. Costello	Mechanics of wire rope (PDF)	Mar 2003	Abstract This report is based on Prof. Gostello's Mordica Lecture, to be given in Atlanta, Georgia, on May 12, 2003.
1019	Junlan Wang, Nancy R. Sottos and Richard L. Weaver	Thin film adhesion measurement by laser induced stress waves (PDF)	Apr 2003	Abstract Also submitted to *Journal of the Mechanics and Physics of Solids* (2003)
1020	P. Bhattacharjee and D. N. Riahi	Effect of rotation on surface tension driven flow during protein crystallization (PDF)	May 2003	Abstract Also submitted to *Microgravity Science and Technology* (2003)
1021	Eliot Fried	The configurational and standard force balances are not always statements of a single law (PDF)	May 2003	Abstract Also submitted to *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* (2003)
1022	Rahul Panat and K. Jimmy Hsia	Experimental investigation of the bond coat rumpling instability under isothermal and	May 2003	Abstract Also submitted to *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences*

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		cyclic thermal histories in thermal barrier systems (PDF)		(2003)
1023	Eliot Fried and Morton E. Gurtin	A unified treatment of evolving interfaces accounting for small deformations and atomic transport: grain-boundaries, phase transitions, epitaxy (PDF)	May 2003	Abstract Accepted to *Advances in Applied Mechanics* (accepted 2003)
1024	Fei Dong, Daniel N. Riahi, and Albert T. Hsui	On similarity waves in compacting media (PDF)	May 2003	Abstract Also submitted to *Advances in Mathematics Research* (2003)
1025	M. Liu and K. J. Hsia	Locking of electric field induced non-180° domain switching and phase transition in ferroelectric materials upon cyclic electric fatigue (PDF)	May 2003	Abstract Also submitted to *Applied Physics Letters* (2003)
1026	Ming Liu, K. Jimmy Hsia, and Mauro Sardela, Jr.	In situ X-ray diffraction study of electric field induced domain switching and phase transition in PZT-5H (PDF)	May 2003	Abstract Also submitted to *Journal of the American Ceramic Society* (2003)
1027	D. N. Riahi	On flow of binary alloys during crystal growth (PDF)	Jun 2003	Abstract Also submitted to *Recent Development in Crystal Growth Research* (2003)

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Publications

Thin film adhesion measurement by laser induced stress waves

Authors: Junlan Wang, Nancy R. Sottos and Richard L. Weaver

Published in: *TAM Reports* 1019, (2003)

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Laser induced stress waves are used to characterize intrinsic interfacial strength of thin films under both tensile and mixed-mode conditions. A short-duration compressive pulse induced by pulsed-laser ablation of a sacrificial layer on one side of a substrate is allowed to impinge upon a thin test film on the opposite surface. Laser-interferometric measurements of test film displacement enable calculation of the stresses generated at the interface. The tensile stress at the onset of failure is taken to be the intrinsic tensile strength of the interface. Fused-silica substrates, with their negative nonlinear elasticity, cause the compressive stress wave generated by the pulse laser to evolve a decompression shock, critical for generation of the fast fall times needed for significant loading of surface film interfaces. By allowing the stress pulse to mode convert as it reflects from an oblique surface, a high amplitude shear wave with rapid fall time is generated and used to realize mixed-mode loading of thin film interfaces. We report

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Thin Film Adhesion Measurement by Laser Induced Stress Waves *

Junlan Wang† Nancy R. Sottos and Richard L. Weaver
Department of Theoretical and Applied Mechanics
University of Illinois at Urbana-Champaign, Urbana, IL 61801

Abstract

Laser induced stress waves are used to characterize intrinsic interfacial strength of thin

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v.71(1992)-v.80(1996)

Physics -- periodicals.
Medical Subject Heading

Content Types

Periodicals

periodicals

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Publication Details

INCLUDED TITLE	Journal of applied physics online
FORMAT	Journals, Magazines, Newspapers
LANGUAGE	English
CONTRIBUTORS	American Institute of Physics American Physical Society
PUBLICATION	New York, N.Y. : American Institute of Physics, c1937-
PUBLICATION DATES	Vol. 8, no. 1 (Jan. 1937)-
PHYSICAL DETAILS	volumes : illustrations ; 27-29 cm
ISSNS	1089-7550, 0021-8979
OCLC	ocm35124573, ocm01754449
FINDING AIDS	Author and subject index: v. 53 (1982)-60 (1986). 1 v.; v. 61 (1987)-70 (1991). 1 v.; v. 71 (1992)-80 (1996). 1 v
PRECEDING TITLES	Physics (Menasha, Wis.)

Notes

Chemical abstracts
Also issued online via the World Wide Web as: Journal of applied physics online.

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260		$aNew York, N.Y. :$bAmerican Institute of Physics,$cc1937-
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321		$aMonthly,$bJan. 1937-Dec. 1983

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730	0_	$aJournal of applied physics online.
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997      $aMARCIVE
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Appendix 101 A



JOURNAL

Journal of the mechanics and physics of solids

Hill, Rodney, 1921-2011.; Baldwin, William Marsh.

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Boeing v. Regents Univ. Cal.

Details

Title	Journal of the mechanics and physics of solids
Other title	J. mech. phys. solids Journal of the mechanics and physics of solids
Creator/Contributor	Hill, Rodney, 1921-2011. › Baldwin, William Marsh. ›
Subjects	Mechanics, Applied › Solids ›
Identifier	ISSN : 0022-5096 OCLC : (OCoLC)1782726
Publisher	London, New York, Pergamon Press. v. 1- Oct. 1952-
Creation date	1952
Format	illus., diagrs. 25 cm.
General notes	Editors: Oct. 1952-<Oct. 1955> R. Hill (with W. M. Baldwin, Oct. 1952-Apr. 1954)
Citations/References	Applied science & technology index, Chemical abstracts, Computer & control abstracts, Electrical & electronics abstracts, Engineering index annual (1968), Engineering index bioengineering abstracts, Engineering index energy abstracts, Engineering index monthly (1984), International aerospace abstracts, Mathematical reviews, Metals abstracts, Physics abstracts, World aluminum abstracts, Engineering index monthly, Nuclear science abstracts,

Boeing Ex. 1006, p. 237 of 328
Boeing v. Regents Univ. Cal.

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222     #0$aJournal of the mechanics and physics of solids
245     00$aJournal of the mechanics and physics of solids.
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300     ##$billus., diagrs. $c25 cm.
362     0#$av. 1- Oct. 1952-
500     ##$aEditors: Oct. 1952-<Oct. 1955> R. Hill (with W. M. Baldwin, Oct. 1952-Apr. 1954)
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Boeing Ex. 1006, p. 238 of 328
Boeing v. Regents Univ. Cal.

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510     2#$aElectrical & electronics abstracts, $x0036-8105 $b1968-
510     2#$aEngineering index annual (1968), $x0360-8557
510     2#$aEngineering index bioengineering abstracts, $x0736-6213
510     2#$aEngineering index energy abstracts, $x0093-8408
510     2#$aEngineering index monthly (1984), $x0742-1974
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510     2#$aMathematical reviews, $x0025-5629
510     2#$aMetals abstracts, $x0026-0924
510     2#$aPhysics abstracts, $x0036-8091 $b1968-
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510     0#$aEngineering index monthly, $x0013-7960
510     0#$aNuclear science abstracts, $x0029-5612
530     ##$aAlso available online
555     0#$a1-20(1952-72) bd w/20.
650     #0$aMechanics, Applied $vPeriodicals.
650     #0$aSolids $vPeriodicals.
700     1#$aHill, Rodney, $d1921-2011.
700     1#$aBaldwin, William Marsh.
936     ##$aMay 1992
945     ##$aJournal of the mechanics and physics of solids. $bJournal of the mechanics and physics of solids.
948     ##$aLTI 10/08/2013
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Boeing v. Regents Univ. Cal.

Appendix 10 0A

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BOOK

Industrial applications of high power laser technology : [seminar], ...

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Main title

Industrial applications of high power laser technology : [seminar], August 24-25, 1976, San Diego, California / John F. Ready, editor ; presented by the Society of Photo-optical Instrumentation Engineers and the Society of Manufacturing Engineers, in cooperation with American Academy of Microbiology ... [et al.].

Published/Created

Palos Verdes Estates, Calif. : SPIE, c1977.

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More Information

LCCN Permalink	https://lccn.loc.gov/77365507
Description	vi, 162 p. : ill. ; 28 cm.
ISBN	0892521139
LC classification	TA1673 .I55
Related names	Ready, John F., 1932- Society of Photo-optical Instrumentation Engineers.

Society of Manufacturing Engineers.

LC Subjects	Lasers--Industrial applications--Congresses.
Browse by shelf order	TA1673
Notes	Proceedings of the seminar. Includes bibliographical references and indexes.
Series	Proceedings of the Society of Photo-optical Instrumentation Engineers ; v. 86 Proceedings of the Society of Photo-optical Instrumentation Engineers ; v. 86.
LCCN	77365507
Dewey class no.	621.36/6
Type of material	Book

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082	00	|**a** 621.36/6
245	00	|**a** Industrial applications of high power laser technology : |**b** [seminar], August 24-25, 1976, San Diego, California / |**c** John F. Ready, editor ; presented by the Society of Photo-optical Instrumentation Engineers and the Society of Manufacturing Engineers, in cooperation with American Academy of Microbiology ... [et al.].
260	__	|**a** Palos Verdes Estates, Calif. : |**b** SPIE, |**c** c1977.
300	__	|**a** vi, 162 p. : |**b** ill. ; |**c** 28 cm.
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500	__	|**a** Proceedings of the seminar.
504	__	|**a** Includes bibliographical references and indexes.
650	_0	|**a** Lasers |**x** Industrial applications |**x** Congresses.

700	1_	|**a** Ready, John F., |**d** 1932-
710	2_	|**a** Society of Photo-optical Instrumentation Engineers.
710	2_	|**a** Society of Manufacturing Engineers.
830	_0	|**a** Proceedings of the Society of Photo-optical Instrumentation Engineers ; |**v** v. 86.
991	__	|**b** c-GenColl |**h** TA1673 |**i** .I55 |**p** 00019747165 |**t** Copy 1 |**v** 86 |**w** BOOKS

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Appendix 1020B
Citations to Fairand

Source Document

Fairand, B. P., & Clauer, A. H. (1976, December). Use of laser generated shocks to improve the properties of metals and alloys. n *Industrial applications of high po er laser technology* (SP Vol. 86, pp. 112-119), **Ex.1020** ("Fairand")

Citations: 1991 – 2002 (in chronological order)

Haefer, R. A., & Haefer, R. A. (1991). Modifi ierung von Oberfl chen durch Laserstrahl-Verfahren. *Oberfl chen und D nnschicht Technologie: Teil II: Oberfl chenmodifi ation durch Teilchen und uanten,* 17-68.

Ruschau, J. J., John, R., Thompson, S. R., & Nicholas, T. (1999, July). Fatigue crack gro th rate characteristics of laser shock peened Ti-6Al-4V.

Roy, R., Gedevanishvili, S., Breval, ., Mistry, P., & Turchan, M. (2 , October). Crystallinity destruction in metals by multiple pulsed lasers of different fre uency. *Materials Letters*, (1), 3 -34.

Montross, C. S., Wei, T., e, L., Clark, G., & Mai, . W. (2 2, October). Laser shock processing and its effects on microstructure and properties of metal alloys a revie . *International ournal of fatigue, 2* (1), 1 21-1 36.

Appendix 10 1A

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Journal of applied physics

Full Record MARC Tags

Main title

Journal of applied physics.

Published/Created

New York, N.Y. : American Institute of Physics, ©1937-

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More Information

LCCN Permalink	https://lccn.loc.gov/33023425
Publication history	Vol. 8, no. 1 (Jan. 1937)-
Description	volumes : illustrations ; 27-29 cm Some numbers issued in 2 or more parts.
Current frequency	Semimonthly, Jan. 1984-
Former frequency	Monthly, 1937-1983
ISSN	0021-8979
Linking ISSN	0021-8979

LC classification	QC1 .J83
Continues	Physics (Menasha, Wis.) 0148-6349 (DLC) 93643738 (OCoLC)3350110
Continued in part by	Society of Rheology (U.S.). Transactions of the Society of Rheology 1957-1977 0038-0032 (DLC) 57011926 (OCoLC)1604813
Serial key title	Journal of applied physics
Abbreviated title	J. appl. physi.
Related names	American Institute of Physics, sponsoring body. American Physical Society, issuing body.
LC Subjects	Physics--Periodicals.
Other Subjects	Physics. 33.00 physics: general. Physics. Angewandte Physik Physik Zeitschrift Natuurkunde. Toepassingen. Physik.
Form/Genre	Periodical. Zeitschrift. Periodicals. Zeitschrift Periodicals.
Browse by shelf order	QC1
Notes	Imprint varies. Published in cooperation with the American Physical Society.
Indexed selectively by	Chemical abstracts 0009-2258
Indexes	Author and subject index: v. 53 (1982)-60 (1986). 1 v.; v. 61 (1987)-70 (1991). 1 v.; v. 71 (1992)-80 (1996). 1 v.
Reproduction no./Source	AIP Member and Subscriber Services Division, 500 Sunnyside Blvd.,

Woodbury, NY 11797

Additional formats	Also issued on microfilm. CD-ROM version: Journal of applied physics (CD-ROM) 1520-8850 (DLC)sn 98004665 (OCoLC)39611003 Online version: Journal of applied physics (Online) 1089-7550 (DLC)sn 96004258 (OCoLC)35124573 Online version: Journal of applied physics (OCoLC)557514443 Online version: Journal of applied physics (OCoLC)608988004
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Additional Links	http://ojps.aip.org/japo/ http://ieeexplore.ieee.org/servlet/opac?punumber=4915369 Restricted to IEEE Xplore subscribers
Type of material	Periodical or Newspaper
Content type	text
Media type	unmediated
Carrier type	volume

Source of description	Latest issue consulted: Vol. 89, no. 8 (15 Apr. 2001).

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CALL NUMBER	QC1 .J83 Copy 1 Unbound issues
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780	00	|**t** Physics (Menasha, Wis.) |**x** 0148-6349 |**w** (DLC) 93643738 |**w** (OCoLC)3350110
785	01	|**a** Society of Rheology (U.S.). |**t** Transactions of the Society of Rheology |**g** 1957-1977 | **x** 0038-0032 |**w** (DLC) 57011926 |**w** (OCoLC)1604813
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Barker, L. M., & Hollenbach, R. . (197 , September). Shock- ave studies of PMMA, fused silica, and sapphire. *ournal of Applied Physics*, (1), 42 8-4226, **Ex. 1021** ("*Bar er*").

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Appendix 10 1

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Volume 127, Issue 2, 30 September 2002, Pages 178-181

Bonding strength of adhesives and surface roughness of joined parts

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Available online 22 March 2002.

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Abstract

The bonding strength of adhesives is influenced by the surface roughness of the joining parts. However, the magnitude of the influence has not yet been clarified because of the complexity of the phenomena. In this paper, it is found that an optimum value of the surface roughness exists with respect to the tensile strength of the adhesion. On the other hand, the peel strength shows no clear relationship with the surface roughness. The shear strength of the adhesion lies in the middle of the above two tendencies.

Previous Next

Keywords

Bonding strength; Surface roughness; Joined parts

1. Introduction

The significance of joining technology with adhesives is increasing in the field of manufacturing because it has many advantages compared with other joining methods. Concerning this technology, it has been said that the surface finish or

surface treatment of the joining parts is very important for the securing of good adhesion, since the surface roughness is one of the important parameters that controls the state of the adhesion [1]. It has been pointed out that the bonding strength is influenced by the surface finish [2]. In 1996, Ikegami [3] examined the influence of the surface roughness on the bonding strength of adhesion and proposed a theoretical curve that shows a relationship between surface roughness and bonding strength. In his paper, he assumed two effects: (1) the effect of surface area; and (2) the notch effect due to the surface roughness. However, experimental verification seems to be not easy because of the scatter of the data.

The object of the present study is to clarify the influence of the surface roughness on the bonding strength of the adhesion.

2. Experiment

2.1. Experimental set-up

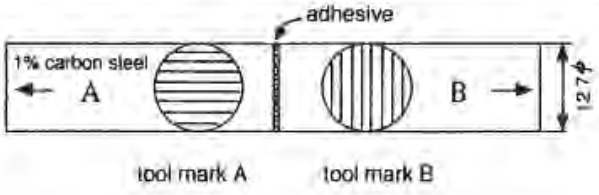
Three experiments were carried out: (1) an experiment on the tensile strength of adhesion; (2) and experiment on the shear strength of adhesion; and (3) an experiment on peel strength of adhesion.

Each test was designed and carried out according to the Japanese standard (JIS). Fig. 1, Fig. 2, Fig. 3 show the dimensions of the specimens for these three tests, respectively. The finishing condition of the specimens is as follows:

(1) Specimen for the tensile test. This is made from 1% carbon steel rod and its joining surface was finished by face milling, the roughness being controlled by changing feed. The tool marks of coupled joining surfaces are oriented so as to make a right angle with each other, as shown in Fig. 1.

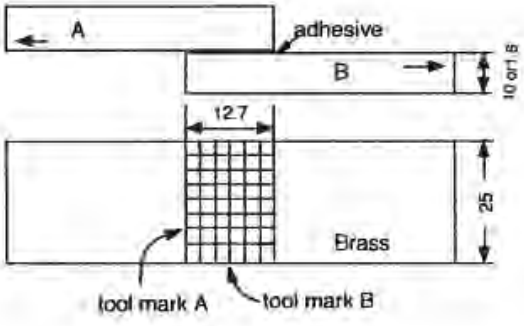
(2) Specimen for the shear test. This is made from brass bar and its joining surface was finished by milling (1.6t) or shaping (10t), the roughness was being controlled by changing feed. The tool marks of coupled joining surfaces are oriented so as to make a right angle with each other, as shown in Fig. 2.

(3) Specimen for peel test. This is made from 0.5mm thick brass sheet and its joining surface was finished by abrasive paper, the roughness being controlled by changing the grain size of the paper. The finishing marks of two mating surfaces are oriented so as to make a right angle with each other.



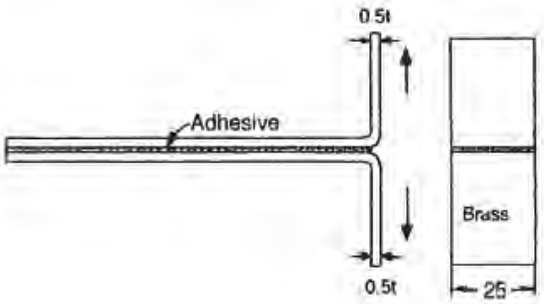
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Fig. 1. Specimen for tensile strength test.



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Fig. 2. Specimen for shear strength test.



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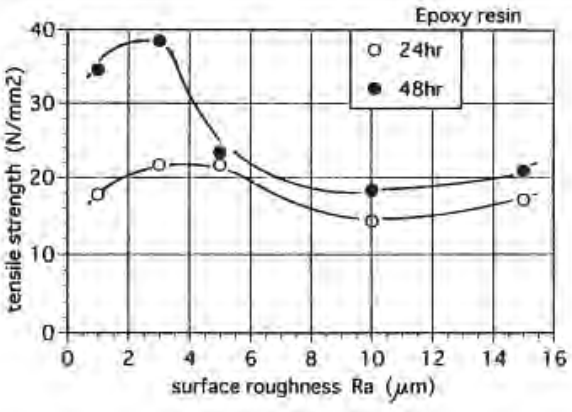
Fig. 3. Specimen for peel strength test.

The specimens were cleaned using acetone before the adhesion process. The contact pressure was kept constant at 20N/cm^2 during the cure. The time of the cure is either 24h or 48h. The tests were repeated five times for every experiment, and the maximum and the minimum data were discarded, the mean value then being calculated using the middle three data.

The adhesives used in the experiments are as follows: (1) epoxy resin; (2) cyanoacrylate; (3) synthetic rubber type; (4) vinyl chloride type; and (5) cellulose type. An Amsler-type testing machine was used for measuring the bonding strength.

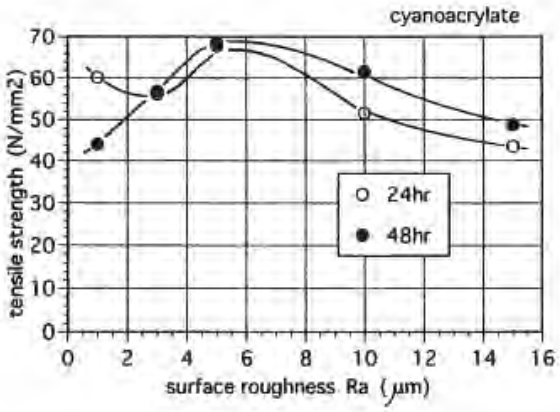
2.2. Experimental results

Fig. 4, Fig. 5, Fig. 6, Fig. 7, Fig. 8 show some results of the strength test. Fig. 4, Fig. 5 show the relationship between the tensile strength of adhesion and the surface roughness for two adhesives (epoxy resin and cyanoacrylate, respectively). An optimum surface roughness that gives the maximum strength is clearly observed in these figures.



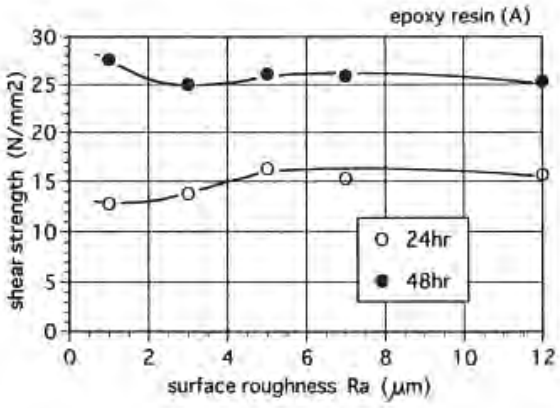
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Fig. 4. Relationship between tensile strength and surface roughness. Adhesive: epoxy resin.



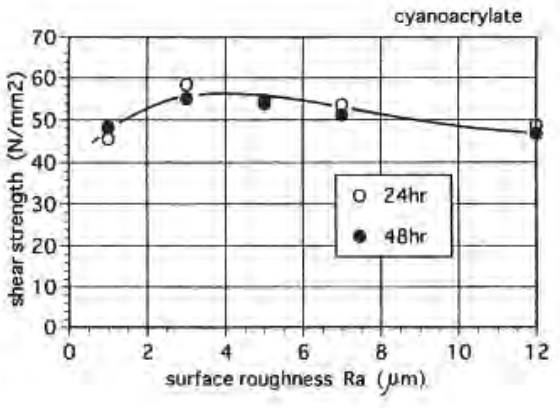
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Fig. 5. Relationship between tensile strength and surface roughness. Adhesive: cyanoacrylate.



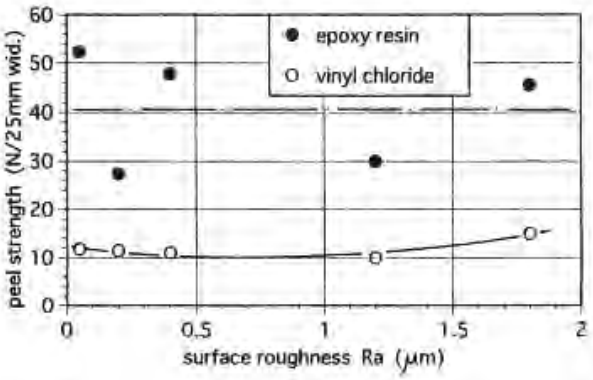
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Fig. 6. Relationship between shear strength and surface roughness. Adhesive: epoxy resin.



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Fig. 7. Relationship between shear strength and surface roughness. Adhesive: cyanoacrylate.



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Fig. 8. Relationship between peel strength and surface roughness. Adhesive: epoxy resin and vinyl chloride type.

Fig. 6, Fig. 7 show the relationship between the shear strength of adhesion and the surface roughness for two adhesives (epoxy resin and cyanoacrylate, respectively). The variation of the strength due to the change of surface roughness is lesser than that of the tensile strength.

Fig. 8 shows the peel strength of two adhesives (epoxy resin and vinyl chloride). No clear relationship is observed in this figure, and this is a common tendency for the other three adhesives.

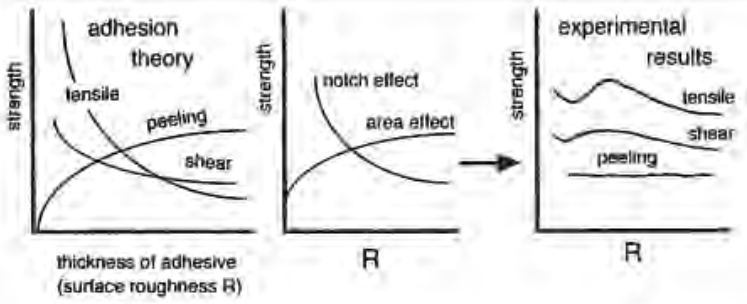
2.3. Discussions

Concerning the tensile strength of adhesion, it is clear that an optimum surface roughness exists that gives the maximum strength of adhesion for the five kinds of adhesives, the optimum surface roughness being in the range from 3 to 6μm Ra. In some cases (cyanoacrylate 24h, cellulose type and vinyl chloride 48h) the tensile strength was found to have a second increase in the range of small surface roughness **(Ra<2 μm)**.

In the case of the shear strength of adhesion, a peak of the strength is virtually unobservable for three kinds of adhesives (epoxy resin, cyanoacrylate and vinyl chloride), but the cellulose type and the synthetic rubber type adhesives showed a peak, just as in the tensile test.

In the peeling test, no remarkable peak is observed with the change of the surface roughness.

Fig. 9 is a schematic illustration of why the strength curve takes a different form according to the kind of testing method. The left figure shows the theoretical value of the bonding strength of the adhesion. According to adhesion theory [1], the tensile strength is inversely proportional to the square of the thickness of the adhesives h, the shear strength is inversely proportional to h, and the peel strength is proportional to the 0.25th power of h. The surface roughness would have nearly the same meaning to the thickness of the adhesives because the directions of the tool marks are oriented so as to make a right angle to each other. This is the reason why the surface roughness R is also shown in this figure as the horizontal axis. The middle figure of Fig. 9 shows schematically the influence of the area effect and the notch effect on the bonding strength [3].



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Fig. 9. Schematic illustration of bonding strength of the adhesion (as a combination of three factors).

The real relationship between the surface roughness and the bonding strength will be the combination of the theoretical value (the left of Fig. 9) and the above two effects (the middle of Fig. 9). This is shown schematically in the right hand figure of Fig. 9. The various pattern of the curves that correspond to various test methods can be attributed to the difference of the magnitude of the combining three elements.

3. Conclusions

The bonding strength of adhesives (epoxy resin, cyanoacrylate, vinyl chloride, synthetic rubber and cellulose type) was measured in which the surface roughness of the mating surfaces was varied systematically. The findings are as follows.

1. An optimum surface roughness exists in the tensile strength of adhesion. The optimum value is in the range from 3 to 6μm. In some cases (cyanoacrylate 24h, cellulose type and vinyl chloride 48h) the tensile strength has a second increase at very small surface roughness ($Ra<2\,\mu m$).

2. No clear relationship is observed between the peel strength and the surface roughness for the five kinds of adhesives.

3. Concerning the shear strength, the tendency of the curve (shear strength–surface roughness) lies between those for the tensile strength and the peel strength.The tendency of the curve showing the relationship between the bonding strength and the surface roughness is explained by considering three factors: (1) the strength based on adhesion theory; (2) the surface area effect; and (3) the notch effect due to the surface roughness.

Acknowledgements

The authors wish to acknowledge 11 students of Toyo University, who joined the “adhesion project” from 1995 to 1998, for their sincere cooperation.

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2021, Journal of Building Engineering

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Creation date	1985-
Format	v. : ill. ; 24 cm.
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Local notes	Selected volumes/issues transferred from the Engineering Societies Library, January 1995.

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Appendix A

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Communication; Information Behavior; Health Informatics; Human Computer Interaction; Usability Studies

Grants & Honors

Cultural Heritage Information Management Project. IMLS grant. Amount: $498,741. Period: Aug. 2012 to July 2015. Co-PI with Dr. Youngok Choi.

D.C. Health Information Technology (HIT4): Building Capacity & Providing Access in Our Nation's Capital. Dept. of Labor H2B Training Grant. Grant amount: $4,175,500. Grant period: Nov. 2011 to Dec. 2015. Partner with the Metropolitan School of Professional Studies of the Catholic University of America, Children's National Medical Center, D.C. Department of Employment Services, Holy Cross Hospital, Howard University, Center for Urban Progress, Providence Hospital, and Sibley Memorial Hospital.

Capital Health Careers Project. Department of Labor Healthcare Sector and Other High Growth and Emerging Industries Grant. Grant amount: $4,953,999. Grant period: March 2010 – February 2013. Awarded to a group of healthcare organizations and educational institutions in Washington, D.C. Providence Health Foundation of Providence Hospital (Lead institution). Part of the grant supported the development of a Master's degree program in Information Technology with a concentration in Health Information Technology offered by the School of Library and Information Science.

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Hsieh-Yee, I. (2006). *Organizing Audiovisual and Electronic Resources for Access: A Cataloging Guide*. 2nd ed. Westport, Conn.: Libraries Unlimited.

NISO A Framework of Guidance for Building Good Digital Collections. 2nd ed. Bethesda, MD: National Information Standards Organization, 2004. Framework Advisory Group: Grace Agnew, Liz Bishoff, Priscilla Caplan (Chair), Rebecca Gunther and Ingrid Hsieh-Yee.

Hsieh-Yee, I. (2004). Cataloging and Metadata Education in North American LIS Programs. *Library Resources & Technical Services,* 48(1): 59-68.

Hsieh-Yee, I. (2004). Cataloging and Metadata Education. In Gary E. Gorman (Ed.), *International Yearbook of Library and Information Management 2003: Metadata Applications and Management*, (pp.204-234). London: Facet Publishing.

Yee, P. L., Hsieh-Yee, I., Pierce, G.R., Grome, R., and Schantz, L. (2004). Self-Evaluative Intrusive Thoughts Impede Successful Searching on the Internet. *Computers in Human Behavior,* 20(1): 85-101.

Hsieh-Yee, I. (2003). Cataloging and Metadata Education: A Proposal for Preparing Cataloging Professionals of the 21st Century. A report submitted to the ALCTS-Education Task Force in response to Action Item 5.1 of the *Bibliographic control of Web Resources: A Library of Congress Action Plan*. Approved by the Association for Library Collections and Technical Services. Web version available since April 2003 at http://lcweb.loc.gov/catdir/bibcontrol/CatalogingandMetadataEducation.pdf.

Hsieh-Yee, I. (2002). Cataloging and Metadata Education: Asserting a Central Role in Information Organization. *Cataloging & Classification Quarterly* 34(½): 203-222.

Hsieh-Yee, I., and Smith, M. (2001). The CORC Experience: Survey of Founding Libraries, Part I. *OCLC Systems & Services,* 17: 133-140. (Received "The Most Outstanding Paper of OCLC Systems & Services in 2001" award.)

Hsieh-Yee, I., and Smith, M. (2001). The CORC Experience: Survey of Founding Libraries, Part II, Automated Tools and Usage. *OCLC Systems & Services,* 17: 166-177. (Received "The Most Outstanding Paper of OCLC Systems & Services in 2001" award.)

Hsieh-Yee, I. (2001). ERIC User Services: Changes and Evaluation for the Future. *Government Information Quarterly,* 18: 31-42.

Hsieh-Yee, Ingrid. (2001). Research on Web Search Behavior. *Library and Information Science Research,* 23: 167-185.

Logan, E., and Hsieh-Yee, I. (2001). Library and Information Science Education in the Nineties. *Annual Review of Information Science and Technology,* 35: 425-477.

Hsieh-Yee, I. (Ed.) (2001). *Library and Information Science Research*, 23 (2). A special issue in honor of the retirement of Douglas L. Zweizig.

Hsieh-Yee, I. (2000). *ERIC User Services: Evaluation in a Decentralized Environment*. Washington, D.C.: Dept. of Education.

Hsieh-Yee, Ingrid. (2000). *Organizing Audiovisual and Electronic Resources for Access: A Cataloging Guide*. Littleton, CO: Libraries Unlimited.

Hsieh-Yee, I. (2000). Organizing Internet Resources: Teaching Cataloging Standards and Beyond. *OCLC Systems & Services,* 16: 130-143. (Received "The Most Outstanding Paper of OCLC Systems & Services in 2000" award.)

Hsieh-Yee, I. (1998). The Retrieval Power of Selected Search Engines: How Well Do They Address General Reference Questions and Subject Questions? *Reference Librarian,* 60: 27-47.

Hsieh-Yee, I. (1998). Search Tactics of Web Users in Searching for Texts, Graphics, Known Items and Subjects: A Search Simulation Study. *Reference Librarian,* 60: 61-85. (Received the 1997 Best ALISE Research Paper Award.)

Hsieh-Yee, I. (1997). Access to OCLC and Internet Resources: LIS Educators' Views and Teaching Practices. *RQ,* 36: 569-86.

Hsieh-Yee, I. (1997). Teaching Online and CD-ROM Resources: LIS Educators' Views and Practices. *Journal of Education for Library and Information Science,* 38: 14-34.

Hsieh-Yee, I. (1996). The Cataloging Practices of Special Libraries and Their Relationship with OCLC. *Special Libraries,* 87: 10-20.

Hsieh-Yee, I. (1996). Modifying Cataloging Practice and OCLC Infrastructure for Effective Organization of Internet Resources. In *Proceedings of the OCLC Internet Cataloging Colloquium*. [Online]. Available: http://www.oclc.org/oclc/man/colloq/hsieh.htm

Hsieh-Yee, I. (1996). Student Use of Online Catalogs and Other Information Channels. *College & Research Libraries,* 57: 161-175.

Hsieh-Yee, I. (1995). Ten entries in James S. C. Hu (Ed.), *Encyclopedia of Library & Information Science*, 913, 1028-29, 1036, 1037, 1145-46, 1514, 1575, 1763-64, 2216-27, 2378-79. Taipei, Taiwan: Sino-American Publishing. (Topics include "Advanced Technology/Libraries," "Information Ethics," "Instruction on Cataloging and Classification," "Instruction on Reference Services.")

Hsieh-Yee, I. (1993). Effects of Search Experience and Subject Knowledge on Online Search Behavior: Measuring the Search Tactics of Novice and Experienced Searchers. *Journal of the American Society for Information Science,* 44: 161-174. (Received the 1993 Best JASIS Paper Award.)

Works in Progress

Hsieh-Yee, I. Actionable lessons for debunking false information: A comparative analysis of literacy lessons in communication and library and information science

Hsieh-Yee, I. Representing diverse voices and communities in cataloging and indexing: The evolution of controlled vocabularies

Hsieh-Yee, I. Information Organization and Retrieval in Practice (a monograph scheduled for completion and publication in 2023)

Presentations

Bailey, T. & Hsieh-Yee, I. (February 2020). The Phenomena of Sharing Misinformation and the Need for Information Literacy. Presented at the 2020 Bridging the Spectrum Symposium, Washington, D.C., February 14, 2020.

Hsieh-Yee, I. and Fragan-Fly, J. (May 2018) Trends, Design & Strategies for Digital Scholarship Services. Presented at the 2018 Maryland/Delaware Library Association Conference, Cambridge, MD.

Hsieh-Yee, I. (February, 2018) Research Data Management: What It Takes to Succeed. Presented at the 10th Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee, I. (February, 2017) *Research Data Management: New Competencies and Opportunities for Information Professionals*. Presented at the 9th Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee, I. and Lawton, P. (February, 2017) *Enhancing Catholic Portal Searches with User Terms and LCSH*. Presented at the 9th Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee, I. (2016, October) *Visualizing Data for Information*. Presented at the 2016 Virginia Library Association Conference, Hot Springs, VA.

Hsieh-Yee, I. (2016, August) *Religious Materials Toolbox for Archivists: Solutions to Problems Facing the Profession*. Presented at Archives * Records 2016, Atlanta, GA.

Hsieh-Yee, I. and Lawton, P. (2016, March) *Enhancing Retrieval of Catholic Materials with LCSH Knowledge Structure*. Presented at the 2016 Catholic Library Association Conference, San Diego, CA.

Fagan-Fry, J. and Hsieh-Yee, I. (2016, February) *Approaches to Digital Scholarship at Top Universities around the World: Scholarly Publishing in the Digital Age.* Presented at the 8th Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee and Fagan-Fry, J. (2016, January) *Innovative Services for Digital Scholarship at Top 100 Research Libraries of the World*. Poster presented at the 2016 Annual Conference of the Association for Library and Information Science Education, Boston, Mass.

Hsieh-Yee, I. and Lawton, P. (2015, June). *Crowdsourcing terms for CRRA portal themes.* Poster presented at the third CRRA symposium and annual meeting, Bringing the created toward the Creator: Liturgical art and design since Vatican II. Catholic Theological Union, Chicago, Illinois.

Hsieh-Yee, I. and Lawton, P. (2015, February). *Crowdsourcing terms for thematic exploration in the Catholic Portal.* Poster presented at the 7th Annual Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee, I., James, R., and Fagan-Fry, J. (2015, February). *Support for digital scholarship at top university libraries of the world*. Poster presented at the 7th Annual Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee, I., Zhang, S., Lin, K., and Cherry, S. (2015, February). *Thus said the end users: Summon experience and support for research workflows*. Poster presented at the 7th Annual Bridging the Spectrum Symposium, Washington, D.C.

Yontz, E., Hsieh-Yee, I., & Houston, S. (2015, February). *Healthy Heroes Summer Reading Club: Developing healthy youth at public libraries.* 11th Annual Jean Mills Health Symposium, Greenville, North Carolina.

Yontz, E., Hsieh-Yee, I., and Houston, S. (2015, January). *Healthy youth and libraries: A pilot study.* Association for Library & Information Science Education (ALISE) Annual Conference, Chicago, Illinois.

Hsieh-Yee, I. (2014, May). *Linking CRRA resources to portal themes via authority files*. Presented at the Catholic Research Resources Alliance 2014 Membership Meeting, Marquette, WI.

Hsieh-Yee, I. (2014, April). *Enhancing subject access to CRRA resources*. Presented at the 2014 Catholic Library Association Conference, Pittsburgh, PA.

Hsieh-Yee, I. (2014, January). *Health Information Technology Program: Educational entrepreneurship in action*. Presented at the 2014 annual Conference of the Association for Library and Information Science Education, Philadelphia, PA

Hsieh-Yee, I., Zhang, S., Lin, K., and Cherry, S. (2014, January). *Discovering information through Summon: An analysis of user search strategies and search success*. Paper presented at the 6th Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee, I. (2012, December). *National Digital Stewardship Alliance and SLIS at CUA: An Educational Partnership*. Paper presented at Best Practices Exchange: Acquiring, Preserving, and Providing Access to Government Information in the Digital Era, Annapolis, MD

Choi, Y. and Hsieh-Yee, I. (2010, January). *Finding Images in an OPAC: Analysis of User Queries, Subject Headings, and Description Notes*. Paper presented at 2nd Annual Bridging the Spectrum Symposium, Catholic University of America, Washington, D.C.

Hsieh-Yee, I. and Coogan, J. (2010, January). *Google Scholar vs. Academic Search Premier: What Libraries and Searchers Need to Know*. Paper presented at 2nd Annual Bridging the Spectrum Symposium, Catholic University of America, Washington, D.C.

Hsieh-Yee, I. (2009, November). *Information Science Education: An LIS School's Perspective*. Paper presented at Annual Meeting of the American Society for Information Science and Technology, Vancouver, British Columbia, Canada.

Hsieh-Yee, I., Menard, E., Ya-Ning Chen, A., Shu-Jiun Chen, S., Kalfatovic, M. R., Wisser. K. M. (2009, November). *Information Organization in Libraries, Archives and Museums: Converging Practices and Collaboration Opportunities*. Presented at Annual Meeting of the American Society for Information Science and Technology, Vancouver, British Columbia, Canada. (Organizer and moderator of this panel.)

Hsieh-Yee, I. and Coogan, J. (2009, July). *Catching up to Google Scholar: The Retrieval Power of Academic Search Premier and Google Scholar*. Poster presented at American Library Association Conference, Chicago, Illinois.

Hsieh-Yee, I., with the CUA Scholarly Communications Project Team. (2009, January). *Digital Scholarship@CUA: Developing an Institutional Repository for CUA*. Poster presented at 1st Annual Bridging the Spectrum Symposium, Catholic University of America, Washington, D.C.

Wise, M., Cylke, K., and Hsieh-Yee, I. **(**2009, January). *Digital Talking Books: Meeting the Needs of the Blind and the Handicapped*. Paper presented at the Bridging the Spectrum Symposium, Catholic University of America, Washington, D.C.

Hsieh-Yee, I. (2009, January). *User Expectations of MERIC*. Presented at the Information Organization Competencies for the 21st Century Discussion Session of the 2009 Conference of the Association for Library and Information Science Education, Denver, Colorado.

Choi, Y., and Hsieh-Yee, I. (2008,November). *Subject Access for Images in an OPAC.* Annual Meeting of the American Society for Information Science and Technology, Columbus, Ohio. (Also co-organized a panel on Retrieving and Using Visual Resources: Challenges and Opportunities for Research and Education.)

Hsieh-Yee, I. (2008, June). *Educating Cataloging Professionals in a Changing Information Environment*. National Taiwan University, Taipei, Taiwan.

Vellucci, S. L., Moen, W.E., Hsieh-Yee, I., Marson, B., and Wisser, K. (2008, January) *Building a Metadata Education and Research Community through MERIC (Metadata Education and Research Information Commons): Demo and Stakeholder Input*. A panel presented at the 2008 Conference of the Association for Library and Information Science Education, Philadelphia, Pennsylvania.

Hsieh-Yee, I., Choi,Y. and Kules, B. (2007, October). *Searching for Books and Images in OPAC: Effects of LCSH, TOC and Subject Domains.* A poster presented at the American Society for Information Science and Technology Annual Meeting, Milwaukee, Wisconsin.

Hsieh-Yee, I. and Coogan, J. (2007, August) *Google Scholar vs. Academic Search Premier: A Comparative Analysis.* Presented to the Faculty and Staff of the University of the District

of Columbia.

Hsieh-Yee, I. and Coogan, J. (2007, June). *Google Scholar vs. Academic Search Premier: A Comparative Analysis*. Presented to the Washington Research Library Consortium Community, Catholic University of America, Washington, D.C.

Hsieh-Yee, I., Choi, Y., and Kules, B.. (2007, June). *What Users Need for Subject Access: Table of Contents or Subject Headings?* A poster presented at the 2007 American Library Association Annual Conference, Washington, D.C., June 2007.

Choi, Y., Hsieh-Yee, I., and Kules, B. (2007, June). *Retrieval Effectiveness of TOC and LCSH.* A paper presented at the Joint Conference on Digital Libraries 2007, Vancouver, Canada.

Vellucci, S. L., Hsieh-Yee, I., and Moen, W.E. (2007, May). *If We Build It, Will They Come? Building a Community of Practice for Metadata Stakeholders.* A poster presented at the Rutgers University Research Day, Bridgeton, New Jersey.

Hsieh-Yee, I. (2007, May). *Federated Searching: User Experience & Perceptions.* International Conference on Information Organization & Retrieval, National Taiwan University, Taipei, Taiwan.

Hsieh-Yee, I. (2007, May). *Search Performance of Google Scholar and Academic Search Premier.* International Conference on Information Organization & Retrieval, National Taiwan University, Taipei, Taiwan.

Hsieh-Yee, I. (2007, May) *MERIC: Building a Digital Commons for Metadata Education & Research.* International Conference on Information Organization & Retrieval, National Taiwan University, Taipei, Taiwan.

Hsieh-Yee, I., and Coogan, J. (2007, March/April). *A Comparative Analysis of Google Scholar and Academic Search Premier.* Poster presented at the Association of College & Research Libraries 13th National Conference, Baltimore, Maryland.

Vellucci, S. L. and Hsieh-Yee, I. (2007, March/April) *They Didn't Teach Me That in Library School! Building a Digital Teaching Commons to Enhance Metadata Teaching, Learning and Research*. On-site presentation and Webcast by Elluminate. A contributed paper presented at the Association of College & Research Libraries 13th National Conference, Baltimore, Maryland. The acceptance rate for contributed paper was 20%. This paper was one of 10 conference papers chosen for live webcast during the conference.

Moen, W., Hsieh-Yee, I. and Vellucci, S.L. (2007, January) *A DSpace Foundation for a Teaching & Research Commons: The Metadata Education and Research Information Commons.* A poster session presented at the Open Repositories Conference 2007, San Antonio, Texas.

Tang, R., Hsieh-Yee, I., and Zhang, S. (2006, November) *User Perception of MetaLib Combined Search*. Paper presented at the Annual Meeting of the American Society for Information Science and Technology, Austin, Texas, Nov. 2006.

Hsieh-Yee, I. (2006, November). *Federated Searching: User Perceptions, System Design, and Library Instructions.* Paper presented at the Annual Meeting of the American Society for Information Science and Technology, Austin, Texas. (Panel organizer, moderator, presenter).

Hsieh-Yee, I. (2006, November). *Building a Digital Teaching Commons to Enhance Teaching and Learning: The MERIC Experience and Challenges.* Paper presented at the Annual Meeting of the American Society for Information Science and Technology, Austin, Texas. (Panel organizer, moderator, presenter)

Hsieh-Yee, I. (2006, September). *Search Performance of Google Scholar and Academic Search Premier.* Paper presented at the ERIC Publishers Meeting, Washington, D.C.

Hsieh-Yee, I., Zhang, S., and Rong Tang, R. (2006, June). *User Perceptions of a Federated Search System*. Poster presented at Joint Conference on Digital Libraries, Chapel Hill, North Carolina.

Hsieh-Yee, I. and Zhang, S. (2006, June). *Preparing Users for Federated Search: Implications of a MetaLib User Perceptions Study.* Paper presented at the 2006 Ex Libris User Groups of North America Conference, Knoxville, Tennessee.

Hsieh-Yee, I. (2006, January). *MERIC Organizations and Navigation*. Paper presented at the 2006 ALISE Annual Conference, San Antonio, Texas.

Hsieh-Yee, I. (2006, January). *Metadata and Cataloging Education: Recommended Competencies.* Paper presented at the 2006 ALISE Annual Conference, San Antonio, Texas.

Hsieh-Yee, I. (2005, November). *Digital Library Evaluation: Progress & Next Steps.* Presentation at the Annual Meeting of the American Society for Information Science & Technology, Charlotte, North Carolina.

Hsieh-Yee, I. (2005, August). *Providing Access to Digital Content: Issues for DL Managers.* Presentation at MDK12 Digital Library Steering Committee Meeting, Columbia, Maryland.

Hsieh-Yee, I. (2005, April). *Enhancing Teaching and Learning: The Role of School Library Media Specialists.* Presentation at Meeting of the Baltimore County Public School System School Media Specialists, Baltimore, Maryland.

Hsieh-Yee, I. (2005, January). *Subject Access and Users: Insights & Inspirations from Marcia J. Bates.* Paper presented at the Historical Perspectives SIG, 2005 Conference of the Association for Library and Information Science Education, Boston, Massachusetts.

Hsieh-Yee, I. (2005, January). *Electronic Resource Management: Practice, Employer Expectations, & CE Interests.* Paper presented at Technical Services Education SIG, 2005 Conference of the Association for Library and Information Science Education, Boston, Massachusetts.

Hsieh-Yee, I. (2004, October). *Library Professionals for the Digital Age: Competencies & Preparation.* Paper presented at Bibliographic Access Management Team meeting, Library of Congress, Washington, D.C.

Hsieh-Yee, I. (2004, January). *Cataloging and metadata expertise for the digital era.* Presented at Preparing 21st Century Cataloging and Metadata Professionals: A Workshop for Educators and Trainers, San Diego and sponsored by ALCTS, ALISE, LC, and OCLC.

Hsieh-Yee, I. (2004, January). *Educating catalogers for the digital era.* Paper presented at the Technical Services SIG, 2004 Conference of the Association for Library and Information Science Education, San Diego.

Hsieh-Yee, I. (2003, July). *Cataloging Education for the 21st Century.* A presentation at the Library of Congress, Washington, D.C.

Hsieh-Yee, I. (2002, January) *Metadata Education and Research Priorities: A Delphi Study of Metadata Experts.* Presentation at the 2002 Conference of the Association for Library and Information Science Education, New Orleans.

Hsieh-Yee, I. (2001, November). *A Delphi Study of Metadata: Preliminary Findings.* Poster session at the 2001 Annual Meeting of the American Society for Information Science & Technology, Washington, D.C.

Hsieh-Yee, I. (2001, June). *Resources on Asian American Children: Analysis of Retrieval by Search Engines and WorldCat.* Presentation at the National Conference on Asian Pacific American Librarians, San Francisco.

Hsieh-Yee, I. (2001, January). *Delphi Study on Metadata: Project Design.* Presentation at Research Awards Session, Association for Library & Information Science Education, Washington, D.C.

Hsieh-Yee, I. (2000, May). *Web Search Behavior Research: Progress and Implications.* Presentation at the Symposium on Evaluating Library and Information Science Research, University of Wisconsin-Madison, Madison, Wisconsin.

Hsieh-Yee, I. (2000, March). *ERIC User Services: Evaluation in a Decentralized Environment.* Presentation at the National ERIC Joint Directors/Technical Meeting, Arlington, Virginia.

Hsieh-Yee, I. (2000, January). *Enhancing Learning with Web Technology.* Presentation at Faculty Conversations, Catholic University of America, Washington, D.C.

Hsieh-Yee, I. (2000, January). *From Surrogates to Objects: CUA's Approaches to Organizing Electronic Resources.* Paper presentation at the Annual Conference of the Association for Library and Information Science Education, San Antonio, Texas.

Yee, P., and Hsieh-Yee, I. (1997, November). *Individual Differences in Search Behavior on the WWW.* A poster session presented at the 38th Annual Meeting of the Psychonomic Society, Philadelphia, Pennsylvania.

Hsieh-Yee, I. (1997, April). *Research + Marketing + Preparation = Job!* Presented at the "Workshop on Resume and Interview Techniques," Special Libraries Association, Student Chapter, Catholic University of America, Washington, D.C.

Hsieh-Yee, I. (1997, February). *Creating CyberCatalogers: Education and Training.* Presentation at ALA's Midwinter Meeting, Washington, D.C.

Hsieh-Yee, I. (1997, February). *Search Tactics of Web Users in Searching for Texts, Graphics, Known Items and Subjects: A Search Simulation Study.* Presented at the Conference of the Association for Library and Information Science Education, Washington, D.C.

Hsieh-Yee, Ingrid. "Beginning Your Special Library/Information Center Career." Presented at SLA's "Career Day," Jan. 11, 1997, Catholic University of America.

Hsieh-Yee, I. (1996, September). *The Roles of Library and Information Scientists in Managing Electronic Information.* Presentation at Hamilton College, Clinton, New York.

Hsieh-Yee, I. (1996, May). *The Future of Cataloging as a Profession.* Presented at "The Cataloging Forum, Library of Congress, Washington, D.C.

Hsieh-Yee, I. (1994, October). *The Impact of the Internet on OPACs.* Presented at the Third Workshop on User Interfaces for OPACs, Library of Congress, Washington, D.C.

Reports

Hsieh-Yee, I., with Knowledge Management Competencies and Performance Action Group of the Federal Knowledge Management Initiative. "From Knowledge Management Competencies to Improved Organizational Performance." April 9, 2009.

Hsieh-Yee, I., with Knowledge Practices Action Group of the Federal Knowledge Management Initiative. "KM Practice in Government Agencies: Findings and Recommendations." April 9, 2009.

Hsieh-Yee, I. "Delphi Study on Metadata." 2001. Three quarterly reports submitted to the Association for Library and Information Science Education.

Hsieh-Yee, I. "College Students' Information Channels: Patterns of Use and Possible Factors in Channel Selection." 1995. Submitted to the Catholic University of America.

Hsieh-Yee, I. "The Information-Seeking Patterns of Scholars and Their Use of an Online Information System." 1994. Submitted to the Council on Library Resources.

Book Reviews

Review of *The Measurement and Evaluation of Library Services*, by Sharon L. Baker and F. Wilfrid Lancaster. *Information Processing and Management* 30 (1994): 450-52.

Review of *Subject Access to Films and Videos, by Sheila S. Intner and William E. Studwell; and Cataloging Unpublished Nonprint Materials*, by Verna Urbanski with Bao Chu Chang and Bernard L. Karon. *Information Processing and Management* 30 (1994): 449-50.

Review of *Automated Information Retrieval in Libraries: A Management Handbook*, by Vicki Anders. *Journal of Library and Information Science* 19 (1993): 98-100.

Review of *Full Text Databases*, by Carol Tenopir and Jung Soon Ro. *Information Processing and Management* 28 (1992): 667-68.

Review of *Descriptive Cataloging for the AACR2R And USMARC: A How-to-Do It Workbook*, by Larry Millsap and Terry Ellen Ferl. *Information Processing and Management* 28 (1992): 809-11.

Review of *MARC Manual: Understanding and Using MARC Records*, by Deborah J. Byrne. *Information Processing and Management* 28 (1992): 537-38.

Service

Professional Associations and Societies

- Library of Congress. RDA Training Program for the Profession. Co-authored with Tim Carlton. 2013-2014.
- 2014 Digital Preservation Outreach & Education Survey. Contributed to the design of the survey, 2014.
- National Digital Stewardship Alliance. Outreach Committee. 2011-2014.
- National Digital Stewardship Residency Program. Advisory Group, 2012-2013.
- FEDLINK Health Information Technology Advisory Council, 2011-2015.

- 2012 Joint Conference on Digital Libraries. Program Planning Committee, Pre-Conference Proposals Review Committee, 2012
- Catholic Research Resources Alliance. Five-Year Strategic Plan Task Force, 2011-2012
- Institute of Museum and Library Services. Grant reviewer. 2004, 2005, 2010.

- Association for Library and Information Science Education.
  * ALISE Bodan Wynar Research Paper Award Committee, 2015, 2016, 2017
  * ALISE Eugene Garfield Dissertation Award Competition, Jury, 2013, 2014
  * ALISE Research Grant Competition Committee. Chair, 2012
  * Pratt-Severn Faculty Innovation Award. Chair, 2009, 2010
  * ALISE Doctoral Poster Jury, 2012
  * "Information Organization Competencies for the 21st Century" Discussion session leader. 2009 Conference of the Association for Library and Information Science Education.
  * Assisted Technical Services SIG Convener in organizing a program, ""Building a Metadata Education and Research Community through MERIC (Metadata Education and Research Information Commons): Demo and Stakeholder Input" for the 2008 ALISE conference.
  * Association for Library Collections and Technical Services/Association for Library and Information Science Education (ALCTS/ALISE) Metadata Education and Research Information Center (MERIC) Advisory Board, Co-Chair (with Sherry Vellucci), 2005-2007. Chair, 2008-2009 (leading the effort to build MERIC, a repository and collaborative space for metadata educators, practitioners, and researchers)
  * Technical Services SIG, Convener, 2004-2005. Organized a program on "Electronic Resources Management: Current Practices, Employer Expectations, and Teaching Strategies" for the 2005 conference in Boston, Massachusetts.
  * Technical Services SIG, Convener, 2003-2004. Organized a program on "Organizing Information with Metadata: Desired Competencies and Teaching Innovations" for the 2004 conference.
  * Technical Services SIG, Convener, 1999-2000. Organized a program on "Teaching the Organization of Electronic Resources" for the 2000 conference.
  * Curriculum SIG, Co-convener (with Sibyl Moses), 1996-97. Organized a program on "Government Information Policy" for the 1997 conference.

- American Society for Information Science & Technology.
  * Reviewer, Conference program panel submissions and poster submissions, 2005, 2006, 2007, 2009, 2011, 2012, 2013, 2014, 2015, 2016, 2017
  * Nomination Committee, 2009-2011
  * Information Science Education Special Interest Group. American Society for Information Science and Technology. Chair-Elect, 2007-2008. Chair 2008-2009.
  * Committee on Information Science Education. 1999-2006.
  * Committee on Information Science Education. Organizing Committee for an orientation program for students at ASIS annual meetings, 1999-2001
  * Committee on Information Science Education. Sub-committee on Student Welfare (focusing on issues related to master's education), 1998-2001

* SIG ED. Organizing Committee for the "Seminar on Research and Career Development" for junior researchers. 1995-96 (chair), 1997-2001
* ISI Doctoral Dissertation Proposal Scholarship Jury, 1997; 2001, 2002
* Pratt-Severn Best Student Research Paper Award Jury. Chair. 1997
* 1998 Midyear Meeting (referee of contributed papers), 1997
* Organizer and moderator of the ASIS Doctoral Forum and the Doctoral Research Seminar 1994-1995
* SIG Human Computer Interaction. Chair-Elect, Chair, 1993-1995
* Doctoral Forum Award Jury, 1995
* Best Student Paper Award Jury, 1995

- American Library Association.
  * Committee on Accreditation, External Review Panelist, 2009- (site visiting team 2013-2014; site visiting team 2016-2017)
  * Association for Library Collections and Technical Services Task Force on Competencies and Education for a Career in Cataloging, member, 2008-2009
  * Facilitator for "What They Don't Teach in Library School: Competencies, Education and Employer Expectations for a Career in Cataloging," an Association for Library Collections and Technical Services Preconference, June 22, 2007 in Washington, D.C. Also a local liaison for bringing this program to the Catholic University of America.
  * Facilitator for a discussion on "Effect of Electronic Resources on Technical Services" at ALA's Midwinter Meeting held in Feb. 1997 in Washington, D.C.
  * International Relations Committee, Subcommittee Task Force for IFLA and China, 1994-1997

- Virginia Association of School Librarians. Scholarships and Awards Committee. 2010-2012

- Federal Knowledge Management Initiative, Knowledge Management Practices Action Group. Member. 2009 (leading the effort to build a knowledge management repository)
- Federal Knowledge Management Initiative, Knowledge Management Competencies & Learning Action Group. Member. 2009 (developing an action plan for helping government knowledge workers and government agencies to develop knowledge management competencies)
- National Center for Education Statistics. Technical Review Panel. 2008.
- External evaluator for a case of promotion to full professorship. University of Tennessee. 2008.
- National Information Standards Organization (NISO). Advisory Board, Revision of "IMLS Framework of Guidance for Building Good Digital Collections," 2004, 2007.
- Library of Congress, Bibliographic Control of Web Resources: A Library of Congress Action Plan. Principal Investigator of Action Item 5.1, focusing on cataloging and metadata education for students and new librarians, 2002-2003. (worked with the Association for Library Collections and Technical Services, Education Task Force)

- Chinese American Librarians Association
  * Chinese American Librarians Association Outstanding Library Leadership Award in Memory of Dr. Margaret Chang Fung, Award Committee, 2016-2017
  * Achievement Award Jury, 2000-2001
  * CALA Goal 2000 Task Force, 1997
  * Scholarship Committee, 1995, 1996-1997 (chair)
  * Board of Directors, 1994-1997
  * Publication Committee, 1993-1995
  * International Relations Committee, 1993-1996

- Sailor[SM] Assessment Advisory Group (An impact study of Sailor, Maryland's Public Information Network), 1995

- Editorial boards
  Journal of Library & Information Science. Editorial Board, 2012-
  Chinese American Librarians Association, *Occasional Papers Series*. Editorial Board, 2009-2016.
  Library Quarterly. Editorial Board, 2003-2008
  Bulletin of the Medical Library Association, 1994-97
  Newsletter editor for the Chinese American Librarians Association, 1989-92

- Referee for the following journals
  Information Processing and Management
  Journal of Digital Information
  Journal of Education for Library and Information Science
  Journal of Information Science
  Journal of Library & Information Science
  Journal of Library Metadata
  Journal of the American Society for Information Science & Technology
  Library and Information Science Research
  Library Quarterly

- Expert reviewer, "Digital Library" course, Evaluation module, University of North Carolina, Chapel Hill, 2007-2008.
- Expert reviewer, "Information Organization" course, University of Michigan, Ann Arbor. 2007.

Catholic University of America

- Academic Senate Committee on Appointments and Promotions, 2005-2008
- Academic Senate Committee on Committees and Rules, 2009-2012, 2019-2022
- Academic Senate representative (for School of Arts & Sciences), 2017-2020

- Academic Senate representative (for School of Library & Information Science) 2003-2012
- Academic Senate Library Committee, Interim Chair (2007), Member, 2008-2012
- Academic Senate Committee on Computing, 1995-2003

- President's Administrative Council, 2010-2012
- Deans' Council, 2010-2012
- Academic Leadership Group, 2010-2012
- Graduate Board, 2010-2012

- School of Arts & Sciences, Committee on Appointments and Promotions, 2015-2019
- School of Arts & Sciences, Academic Council, 2015-2016.
- School of Arts & Sciences, Ordinary Professor Group, 2013-
- Doctoral Dissertation Defense Committee, Chair, Dept. of Psychology, 2016, 2017, 2018, 2019, 2020, 2021, 2022
- Doctoral Dissertation Defense Committee, Chair, Dept. of Education, 2014, 2015, 2017, 2018, 2019
- Doctoral Dissertation Defense Committee, Chair, National Catholic School of Social Services, 2019, 2020, 2021
- Doctoral Dissertation Defense Committee, Chair, School of Nursing, 2006, 2008
- CUA Scholarly Communication Project Team, Member (2007), Chair, 2008-2009
- Dean Search Committee, 1992-1994, 1998-1999, 2002-2003, 2006-2007
- Fulbright Review Panel, 2006
- CUA Service Learning Advisory Board, 2001-2002
- CUA Faculty Conversations on Enhancing Teaching and Learning through Technology, Planning Group, 1999-2001
- CUA Initiative on Technology and Teaching, 1998-2001

Dept. of Library and Information Science

- Admissions Committee, 2007-2009, Chair 2010-2012, Member 2013-2015, Member 2018-2022
- Appointments and Promotions Committee, 1991-2022
- Student advisement, 1990-2022
- 4+1 Bachelor to Master program, Program Advisor, 2014-2022
- LIS Minor, Advisor, 2017-2022
- Curriculum Committee, 2020-21 (Member), 2021-2022 (Chair)
- Scholarship & Awards Committee, 2016-2018, 2020-21
- Comprehensive examination editor, 2020-21
- Symposium, Colloquium, Lecture Series Committee, May 2018-May 2020 (Chair)
- Symposium and Colloquium Committee, fall 2016-May 2018
- Bridging the Spectrum Symposium session moderator, 2018, 2019, 2020, 2021

- Organization of Information Core Course Outcomes Assessment, 2019, 2020
- The Information Professions in Society Core Course Outcomes Assessment, 2019, 2020
- Community Services Librarianship, Course of Study Review and Revision, 2020
- Organization of Information, Course of Study Review and Revision, 2019
- Organization of Information, Competency and Course Offerings Review, 2018-2019
- Accreditation presentation, Chair, June 2015-August 2016
- Interim Co-Chair, June 2015-August 2016.
- Blended/OWL Learning Committee, spring 2016-2018
- Technology Committee, fall 2016-2017
- Comprehensive examination editor, 2016-2017, reader (every year since 1990)
- LIS Advisory Board, 2015-2016 (chair); fall 2016- May 2018 (member)
- Committee on Planning and Assessment, 2015-2016 (chair)
- Senior Faculty Committee, 2014-2016.
- Accreditation Steering Committee, 2014-2016 (Chair, 2015-2016)
- Accreditation Students Standard Committee, co-chair, 2014-2016
- Accreditation Mission, Goals, and Objectives Standard Committee, co-chair, 2014-2016
- Accreditation Curriculum Standard, member 2014-2-16
- Accreditation Administration and Finance Standard, member 2014-2016
- Cultural Heritage Information Management Project (IMLS-funded), Co-PI, 2012-2015
- Cultural Heritage Information Management Forum (scheduled for June 2015), Co-Organizer, 2013-2015
- Health Information Technology Interim Review Committee, 2015 (chair)
- Health Sciences Librarianship Advisory Group, 2015- (chair)
- Comprehensive examination editors, 2013-2014, 2016-2017
- National Digital Stewardship Alliance liaison, 2011-2014
- Advisory Board, Chair 2010-2012
- Academic Honesty Committee, Chair, 2008-2012
- Blended Learning Committee, 2010-2012
- Colloquium Committee, 2010-2012
- Comprehensive Examination Administration, 2010-2012
- Cultural Heritage Information Management Advisory Committee, 2010-2012 (chair), 2013-
- Curriculum Committee, 1991-2003, 2007-2009, Chair 2010-2012, member 2013-
- Curriculum Subcommittee on Comprehensive Examination, Chair 2009-2012
- Health Information Technology Advisory Board, Chair 2010-2012. Member 2013-
- Health Sciences Advisory Committee, 2009, Chair 2010-2012. Member 2013-
- HIT Expert Forum, Chair 2012. Member 2013-2015
- Health Information Technology Student Group Advisor, 2011-2012
- State Council for Higher Education of Virginia, SLIS Representative, 2010-2012
- Symposium Planning Committee, 2010-2012
- Website Management Team, Chair, 2010-2012
- Urban School Librarianship Project (IMLS-Funded), PI, 2007-2011 (chair, 2010-11)

- Failing Grades Committee, 1995-1997 (chair), 2000-2001 (chair), 2004-2005 (chair), 2007 (chair)-2011
- Faculty Search Committee, 1994-1998, 2002-2004, 2006 (chair), Fall 2007-2009, Chair fall 2009-2012
- Recruitment Committee, Chair 2010-2012
- Strategic Planning Committee, Chair 2010-2012
- Technology Committee, 2010-2012
- Accreditation Advisory Committee, 2007-2009
- Accreditation Coordinating Committee, 2007-2009
- Accreditation Steering Committee, 2007-2009
- SLIS Advisory Group, 2007-2009
- Accreditation Curriculum Standard Committee, Co-chair, 2007-2009
- Accreditation Faculty Standard Committee, Co-chair, 2007-2009
- LSC 551 Information Organization Review Team, Co-chair, 2008-2009, 2015-2016.
- Curriculum Subcommittee on Portfolios, 2009
- LSC 555 Information Systems in Libraries and Information Centers Review Team, contributor, 2008-2009
- Redesign of LSC 730 Use and Users of Libraries and Information. 2009-
- Development of a metadata institute that was taught as LSC 715 Organization of Internet Resources in 2008. The institute is being revised and will be offered in 2010 under a new course title.
- Development of lesson plans, assignments, and evaluation rubrics for LSC 606, Cataloging and Classification, for the School's NCATE accreditation. 2008
- Howard and Mathilde Rovelstad Scholarship Committee, Chair, 2004-2007
- Assistant Dean Search Committee, Chair, Fall 2007
- Liaison to the Association for Library Collections and Technical Services to bring its preconference program, Cataloging Education and Employer Expectations, to CUA during the 2007 American Library Association Annual Meeting in Washington, D.C.
- Organizer of the colloquium presentation and reception for Tamar Sadeh of Ex Libris on PRIMO June 2007
- Practicum review and design (work with potential supervisors, such as the American Indian Museum internship description revision) 2006-
- Comprehensive examinations (edits, proctoring, and grading), 1990-
- SLIS Web site redesign: Comments and suggestions. Fall 2007
- Conducted surveys of current students and alumni in preparation for the 2005 re-accreditation, 2004-2005
- Technology Committee, 1992-1999 (chair, 1996-1998), 2002-2003 (member)
- Colloquia Committee 1997-1999, 2002-2003.
- Advisor of the CUA Student Chapter of the American Society for Information Science and Technology, 2002-2003
- Visiting Professor Search Committee, 1999, 2000, 2001
- Leader, Participation in the CORC experiment, 1999-2000
- Advisor of the Special Libraries Association Student Chapter, 1993-1999; the group was recognized for outstanding leadership by SLA in 1999.

- COA planning Committee, Task Force on Electronic Presentation of SLIS Reports (team leader) 1997-1998
- COA Planning Committee, Subcommittee on Technology 1996-1998
- NLM practicum coordinator, 1997-1998
- Computer Literacy Workshops: Assisted with the development and evaluation of the workshops, 1996-1998
- Leader, Participation in the InterCat project, 1995-1997

Appendix B

MARC 21 Reference Materials

Part VII: A Summary of Commonly Used MARC 21 Fields
Part VIII: A List of Other Fields Often Seen in MARC Records
Part IX: The Leader
Part X: Field 008 for Books

Part VII:

A Summary of Commonly Used MARC 21 Fields

This is a summary of the MARC 21 tags used most frequently by libraries in entering their own bibliographic records. For full listings of all MARC 21 tags, indicators, and subfield codes, see *MARC 21 Format for Bibliographic Data*.

In the explanations on these pages:

Tags -- The tags (3-digit numbers) are followed by the names of the fields they represent. In this summary, and in the *MARC 21 Format for Bibliographic Data*, if a tag can appear more than once in one bibliographic record, it is labeled repeatable (R). If it can only be used once, it is labeled non-repeatable (NR). For example, a catalog record can have several subjects, so the tags for subject added entries (6XX) are labeled repeatable (R).

Indicators -- The use of indicators is explained in fields where they are used. Indicators are one-digit numbers. Beginning with the 010 field, in every field -- following the tag -- are two character positions, one for Indicator 1 and one for Indicator 2. The indicators are not actually defined in all fields, however. And it is possible that a 2nd indicator will be used, while the 1st indicator remains undefined (or vice versa). When an indicator is undefined, the character position will be represented by the character # (for blank space).

Subfield codes -- All the data in each field (beginning with the 010 field) is divided into subfields, each of which is preceded by a delimiter-subfield code combination. The most common subfield codes used with each tag are shown. Each subfield code is preceded by the character $, signifying a delimiter. The name of the subfield follows the code.

In general, every field MUST have a subfield 'a' (**$a**). One exception that is often seen is in Field 020 (ISBN), when the ISBN information (subfield **$a**) is unavailable but the price (subfield **$c**) is known. Some subfields are repeatable. In this summary, repeatability is noted for only the more common repeatable subfields.

Examples: Examples follow the explanation for each field. For clarity, one space has been placed between the tag and the first indicator, one space has been placed between the second indicator and the first delimiter- subfield code, and one space has been inserted between the delimiter-subfield code and the subfield data.

010 Library of Congress Control Number -- (LCCN)
(NR, or Not Repeatable
Indicators undefined.

Subfield used most often:

$a -- Library of Congress control number

```
Example:    010 ##  $a ###86000988#
```

020 International Standard Book Number -- (ISBN)
(R, or Repeatable)

Indicators undefined.

Subfields used most often:

$a -- International Standard Book Number
$c -- Terms of availability (often a price)
$z -- Cancelled/invalid ISBN (R)

```
Example:    020 ##  $a 0877547637
```

040 Cataloging source -- (NR)

Indicators undefined.

Subfields used most often:

$a -- Original cataloging agency
$c -- Transcribing agency
$d -- Modifying agency (R)

```
Example:    040 ## $a DLC
                   $c DLC
                   $d gwhs
```

100 Main entry -- Personal name -- (primary author)
(NR; there can be only one main entry)

Indicator 1: Type of personal name entry element

0 -- Forename
1 -- Surname (this is the most common form)
3 -- Family name

Indicator 2 undefined.

Indicator 2 became obsolete in 1990. Older records may display 0 or 1

Subfields used most often:

$a -- Personal name
$b -- Numeration
$c -- Titles and other words associated with a name (R)
$q -- Fuller form of name
$d -- Dates associated with a name (generally, year of birth)

```
Example:    100 1# $a Gregory, Ruth W.
```

```
                        $q (Ruth Wilhelme),
                        $d 1910–
```

130 Main entry -- Uniform title -- (NR)

Indicator 1: Nonfiling characters

0-9 -- Number of nonfiling characters present (for initial articles, including spaces)

Indicator 2 undefined.

Indicator 2 became obsolete in 1990. (See 100 above.)

Subfields used most often:

$a -- Uniform title
$p -- Name of part/section of a work (R)
$l -- Language of a work
$s -- Version
$f -- Date of a work

```
Example:    130 0# $a Bible.
                   $p O.T.
                   $p Psalms.
```

240 Uniform title (NR)

Indicator 1: Uniform title printed or displayed

0 -- Not printed or displayed
1 -- Printed or displayed (most common)

Indicator 2: Nonfiling characters

0-9 -- Number of nonfiling characters present (for initial articles, including spaces)

Subfields used most often:

$a -- Uniform title
$l -- Language of a work
$f -- Date of a work

```
Example:    240 10 $a Ile mystérieuse.
                   $l English.
                   $f 1978
```

245 Title Statement (NR)

Indicator 1: Title added entry

(Should the title be indexed as a title added entry?)

0 -- No title added entry

(indicates a title main entry; i.e. no author is given)

1 -- Title added entry

(the proper indicator when an author given in 1XX; the most common situation)

Indicator 2: Nonfiling characters

0-9 -- Number of nonfiling characters present, including spaces; usually set at zero, except when the title begins with an article; e.g., for *The robe*, the second indicator would be set to 4. The letters *T*, *h*, *e*, and the space following them are then ignored in alphabetizing titles. The record will be automatically filed under "*r*" -- for *Robe*.

Subfields used most often:

$a -- Title proper
$h -- Medium (often used for non-book media)
$p -- Name of part/section of a work (R)
$b -- Reminder of title (subtitles, etc.)
$c -- Remainder of title page transcription/Statement of responsibility

```
Example:    245 14 $a The DNA story :
                   $b a documentary history of gene
                      cloning /
                   $c James D. Watson, John Tooze.
```

246 Varying form of title (R)

Indicator 1: Note/title added entry controller
1 -- Note, title added entry
3 -- No note, title added entry

Indicator 2: Type of title
-- No information provided
0 -- Portion of title
1 -- Parallel title
4 -- Cover title
8 -- Spine title

Subfield used most often:
$a -- Title proper

```
Example:    246 3# $a Four corners power review
```

250 Edition statement (NR)

Indicators undefined.

Subfield used most often:
$a -- Edition statement

```
Example:    250 ## $a 6th ed.
```

260 Publication, distribution, etc. (Imprint) (R)

Indicator 1: Sequence of publishing statements
-- No information provided

Indicator 2: Undefined

Subfields used most often:

$a -- Place of publication, distribution, etc. (R)
$b -- Name of publisher, distributor, etc. (R)
$c -- Date of publication, distribution, etc. (R)

```
Example:    260 ## $a New York :
                   $b Chelsea House,
                   $c 1986.
```

300 Physical description (R)

Indicators undefined.
Subfields used most often:

$a -- Extent (number of pages) (R)
$b -- Other physical details (usually illustration information)
$c -- Dimensions (cm.) (R)
$e -- Accompanying material (for example, "teacher's guide" or "manual")

```
Example:    300 ## $a 139 p. :
                   $b ill. ;
                   $c 24 cm.
```

440 Series statement / Added entry--Title

This field was made obsolete in 2008 to simplify the series statement. See 490 and 830.

490 Series statement (No added entry is traced from field) (R)

Indicator 1: Specifies whether series is traced (whether an 8XX tag is also present)

0 -- Series not traced
1 -- Series traced (8XX is in record)

Indicator 2 undefined.
Subfield used most often:

$a -- Series statement (R)
$v -- Volume number (R)

```
Example:    490 1# $a Colonial American craftsmen
```

500 General note (R)

Indicators undefined.
Subfield used most often:

$a -- General note (Used when no specialized note field has been defined for the information. Examples: Notes regarding the index; the source of the title; variations in title; descriptions of the nature, form, or scope of the item.)

```
Example:    500 ##  $a Includes index.
```

504 Bibliography, etc. note (R)

Indicators undefined.

Subfield used most often:

$a -- Bibliography, etc. note

```
Example:    504 ## $a Includes bibliographical
                     references.
```

505 Formatted contents note (R)

Indicator 1: Type of contents note

0 -- Complete contents

1 -- Incomplete contents (used with multivolume set when some volumes are not yet published)

2 -- Partial contents

Indicator 2: Level of content designation

-- Basic

Subfield used most often:

$a -- Formatted contents note

```
Example:    505 0# $a Pride and prejudice -- Emma
                     -- Northanger Abbey.
```

520 Summary, etc. note (R)

Indicator 1: Display constant controller

-- Summary

1 -- Review

2 -- Scope and content

3 -- Abstract

Indicator 2 undefined

Subfields used most often

$a -- Summary, abstract, or annotation

$b -- Expansion of summary note

```
Example:    520 ## $a This basic guide to parliamentary
                     procedure tells how to conduct
                     and participate in a meeting
                     properly.
```

600 Subject added entry -- Personal name (R)

Indicator 1: Type of personal name entry element

0 -- Forename

1 -- Surname (this is the most common form)
3 -- Family name

Indicator 2: Subject heading system/thesaurus (identifies the specific list or file which was used)

0 -- Library of Congress Subject Headings
1 -- LC subject headings for children's literature
2 -- Medical Subject Headings
3 -- National Agricultural Library subject authority file
4 -- Source not specified
5 -- Canadian Subject Headings
6 -- Répertoire de vedettes-matière
7 -- Source specified in subfield $2

(Note regarding Sears subject headings: The MARC 21 format does not provide an assigned indicator for Sears subject headings. Therefore, an indicator of 7 is used, and the MARC defined code "sears" is placed in subfield $2.)

Subfields used most often:

$a -- Personal name (surname and forename)
$b -- Numeration
$c -- Titles and other words associated with a name (R)
$q -- Fuller form of name
$d -- Dates associated with a name (generally, year of birth)
$t -- Title of a work
$v -- Form subdivision (R)
$x -- General subdivision (R)
$y -- Chronological subdivision (R)
$z -- Geographic subdivision (R)
$2 -- Source of heading or term (used with 2nd indicator of 7)

```
Example:    600 10 $a Shakespeare, William,
                   $d 1564-1616
                   $x Comedies
                   $x Stage history.
```

```
Example:    600 10 $a Shakespeare, William,
                   $d 1564-1616
                   $x Knowledge
                   $z Rome
                   $v Congresses.
```

Notice that subfields $v, $x, and $z in the 600 field are repeatable. Subfields $v, $x, $y, and $z do not have to be in alphabetical order. They will be in the order prescribed by the instructions given by the subject heading system.

610 Subject added entry -- Corporate name (R)

*Indicator 1:*Type of corporate name entry element

0 -- Inverted name (not used with AACR2)
1 -- Jurisdiction name
2 -- Name in direct order

Indicator 2: Subject heading system/thesaurus.
See indicator 2 under 600

Subfields used most often:
$a -- Corporate name or jurisdiction name as entry element
$b -- Subordinate unit (R)
$v -- Form subdivision (R)
$x -- General subdivision (R)
$y -- Chronological subdivision (R)
$z -- Geographic subdivision (R)
$2 -- Source of heading or term (used with 2nd indicator of 7)

```
Example:    610 10 $a United States.
                   $b Army Air Forces
                   $v Biography.
```

650 Subject added entry -- Topical term (Most subject headings fit here.) (R)

Indicator 1: Level of subject
-- No information provided

Indicator 2: Subject heading system/thesaurus
(identifies the specific list or file which was used)
0 -- Library of Congress Subject Headings
1 -- LC subject headings for children's literature
2 -- Medical Subject Headings
3 -- National Agricultural Library subject authority file
4 -- Source not specified
5 -- Canadian Subject Headings
6 -- Répertoire de vedettes-matière
7 -- Source specified in subfield $2

Note regarding Sears subject headings: The MARC 21 format does not provide an assigned indicator for Sears subject headings. Therefore, an indicator of 7 is used, and the MARC defined code "sears" is placed in subfield $2.)

Subfields used most often:
$a -- Topical term
$v -- Form subdivision (R)
$x -- General subdivision (R)
$y -- Chronological subdivision (R)
$z -- Geographic subdivision (R)
$2 -- Source of heading or term used with 2nd indicator of 7)

```
Example:    650 #0 $a Theater
                   $z United States
                   $v Biography
                   $v Dictionaries.
```

Notice that subfields $v, $x, and $z in the 650 field are repeatable. Subfields $v, $x, $y, and $z do not have to be in alphabetical order. They will be in the order prescribed by the instructions given by the subject heading system.

651 Subject added entry -- Geographic name (R)

Indicator 1: undefined.

Indicator 2: Subject heading system/thesaurus.

See indicator 2 under 600

Subfields used most often:

$a -- Geographic name
$v -- Form subdivision (R)
$x -- General subdivision (R)
$y -- Chronological subdivision (R)
$z -- Geographic subdivision (R)
$2 -- Source of heading or term (used with 2nd indicator of 7)

```
Example:    651 #0 $a United States
                   $x History
                   $v Chronology.
```

Notice that subfields $v, $x, and $z in the 651 field are repeatable. Subfields $v, $x, $y, and $z do not have to be in alphabetical order. They will be in the order prescribed by the instructions given by the subject heading system.

700 Added entry -- Personal name (R)

Indicator 1: Type of personal name entry element

0 -- Forename
1 -- Surname (this is the most common form)
3 -- Family name

Indicator 2: Type of added entry

-- No information provided (most common; co-authors, editors, etc.)
2 -- Analytical entry (The values for Indicator 2 changed in 1994 with Format Integration, and older records may display additional values. An analytical entry involves an author/title of an item contained in a work.)

Subfields used most often:

$a -- Personal name
$b -- Numeration
$c -- Titles and other words associated with a name (R)
$q -- Fuller form of name
$d -- Dates associated with a name (generally, year of birth)
$e -- Relator term (such as ill.) (R)
$4 -- Relator code (R)

```
Example:    700 1# $a Baldridge, Letitia.
```

710 Added entry -- Corporate name (R)

Indicator 1: Type of corporate name entry element

0 -- Inverted name (not used with AACR2)

1 -- Jurisdiction name

2 -- Name in direct order

Indicator 2: Type of added entry.

See Indicator 2 under 700

-- No information provided

2 -- Analytical entry

Subfields used most often:

$a -- Corporate name or jurisdiction name as entry element

$b -- Subordinate unit (R)

```
Example:    710 2# $a Sunburst Communications (Firm)
```

740 Added entry -- Uncontrolled related/analytical title (R)

Indicator 1: Nonfiling characters

0-9 -- Number of nonfiling characters present (for initial articles, including spaces)

*Indicator 2:*Type of added entry. See Indicator 2 under 700

-- No information provided

2 -- Analytical entry

(This field was redefined in 1994 with Format Integration. Prior to 1994, the field was also used for variant titles, such as a different wording on a spine title. In records created since Format Integration, those variant tiles appear in a 246 field.)

Subfield used most often:

$a -- Title

```
Example:    740 02 $a Uncle Vanya.
```

800 Series added entry -- Personal name (R)

Indicator 1: Type of personal name entry element

0 -- Forename

1 -- Surname

3 -- Family name

Indicator 2 undefined.

Subfields used most often:

$a -- Personal name

$b -- Numeration

$c -- Titles and other words associated with a name (R)

$q -- Fuller form of name

$d -- Dates associated with a name (generally, year of birth)
$t -- Title of a work (the series)
$v -- Volume number

```
Example:    800 1# $a Fisher, Leonard Everett.
                  $t Colonial American craftsmen.
```

830 Series added entry -- Uniform title (R)

Indicator 1 undefined.
Indicator 2: Nonfiling characters
0-9 -- Number of nonfiling characters present (for initial articles, including spaces)
Subfield used most often:
$a -- Uniform title
$v -- Volume number

```
Example:    830 #0 $a Railroads of America (Macmillan)
```

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Part VIII:

A List of Other Fields Often Seen in MARC Records

001 Control number
003 Control number identifier
005 Date and time of latest transaction
006 Fixed-length data elements -- additional material characteristics
007 Physical description fixed field
008 Fixed length data elements (See Part X)
022 International Standard Serial Number (ISSN)
037 Source of acquisition
041 Language code
043 Geographic area code
050 Library of Congress call number
060 National Library of Medicine call number
082 Dewey Decimal classification number (the one recommended by the Library of Congress; locally-assigned call numbers may appear elsewhere)
110 Main entry -- Corporate name (less frequent under AACR2 rules)
256 Computer file characteristics
263 Projected publication date
(indicates a CIP -- Cataloging in Publication -- record)

306 Playing time
508 Creation/production credits note
510 Citation/references note (review sources)
511 Participant or performer note
521 Target audience note (first indicator: 0 = reading grade level, 1 = interest age level, 2 = interest grade level, 3 = special audience characteristics, 4 = motivation interest level)
530 Additional physical form available note
538 System details note
586 Awards note
656 Index term -- Occupation
730 Added entry -- Uniform title
852 Location
856 Electronic location and access
9XX Reserved for local use. (They are used by vendors, systems, or individual libraries to exchange additional data)

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Part IX:

The Leader

There are 24 positions in the Leader, numbered from 00 to 23. For fuller explanation, see the *MARC 21 Format for Bibliographic Data*.

00-04 Record length (calculated by the computer for each record)
05 Record status
- a = increase in encoding level
- c = corrected or revised
- d = deleted
- n = new
- p = increase in encoding from prepublication (previous CIP)

06 Type of record
- a = language material
- c = printed music
- d = manuscript music
- e = cartographic material
- f = manuscript cartographic material
- g = projected medium
- i = nonmusical sound recording
- j = musical sound recording
- k = 2-dimensional nonprojectable graphic
- m = computer file
- o = kit
- p = mixed materials
- r = 3-dimensional artifact or naturally occurring object
- t = manuscript language material

07 Bibliographic level
- a = monographic component part
- b = serial component part

c = collection
d = subunit
i = integrating resource
m = monograph/item
s = serial

08 Type of control
= no specified type
a = archival

09 Character coding scheme
= MARC-8
a = UCS/Unicode

10 Indicator count (always "2")

11 Subfield code count (always "2")

12-16 Base address of data (calculated by the computer for each record)

17 Encoding level
= full level
1 = full level, material not examined
2 = less-than-full level, material not examined
3 = abbreviated level
4 = core level
5 = partial (preliminary) level
7 = minimal level
8 = prepublication level (CIP)
u = unknown
z = not applicable

18 Descriptive cataloging form
= non-ISBD
a = AACR2
i = ISBD
u = unknown

19 Multipart resource record level
= Not specified or not applicable
a = Set
b = Part with independent title
c = Part with dependent title

20 Length of the length-of-field portion (always "4")

21 Length of the starting-character-position portion (always "5")

22 Length of the implementation-defined portion (always "0")

23 Undefined (always "0")

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Part X:

Field 008 for Books

Field 008 is used for Fixed Length Data Elements ("Fixed Field Codes"). There are 40 character positions in field 008, numbered from 00-39. Undefined positions must contain either a blank (#) or a fill character (|). Positions 00-17 and 35-39 are defined the same way for all media.

The information shown here for positions 18-34 applies only to books. For explanation of all the positions below and for positions 18-34 for other media, see the *MARC 21 Format for Bibliographic Data*.

Note that field 008 has no indicators or subfield codes.

00-05 Date entered on file (YYMMDD),
where Y=year, M=month, and D=day

06 Type of date/publication status:
- b = no dates given; B.C. date involved
- e = detailed date
- s = single known date/probable date
- m = multiple dates
- r = reprint/reissue date (Date 1) and original date (Date 2)
- n = dates unknown
- q = questionable date
- t = publication date and copyright date
- | = no attempt to code

07-10 Date 1/beginning date of publication

11-14 Date 2/ending date of publication

Date fields contain the year(s) of publication. The type of date(s) in these elements are specified in fixed field element 06: Type of date/publication status. (For further details, see the field 008 description in the *MARC 21 Format for Bibliographic Data*.)

15-17 Place of publication, production, or execution
For example:
- pk# = Pakistan
- cau = California (US)

(For a full list of codes used in these positions, see the *MARC Code List for Countries*.)

18-21 Illustrations (up to 4 codes):
- # = no illustrations
- a = illustrations
- b = maps
- c = portraits
- d = charts
- e = plans
- f = plates
- g = music
- h = facsimiles
- i = coats of arms
- j = genealogical tables
- k = forms
- l = samples
- m = phonodisc, phonowire, etc.
- o = photographs
- p = illuminations
- | = no attempt to code

22 Target audience:
- # = unknown or not specified
- a = preschool

b = primary
c = pre-adolescent
d = adolescent
e = adult
f = specialized
g = general
j = juvenile
| = no attempt to code

23 Form of item:
= none of the following
a = microfilm
b = microfiche
c = microopaque
d = large print
f = braille
r = regular print reproduction
s = electronic
| = no attempt to code

24-27 Nature of contents (up to 4):
= no specified nature of contents
a = abstracts/summaries
b = bibliographies (is one or contains one)
c = catalogs
d = dictionaries
e = encyclopedias
f = handbooks
g = legal articles
i = indexes
j = patent document
k = discographies
l = legislation
m = theses
n = surveys of literature
o = reviews
p = programmed texts
q = filmographies
r = directories
s = statistics
t = technical reports
u = standards/specifications
v = legal cases and notes
w = law reports and digests
z = treaties
| = no attempt to code

28 Government publication:
= not a government publication
i = international intergovernmental
f = federal/national
a = autonomous or semi-autonomous component
s = state, provincial, territorial, dependent, etc.
m = multistate
c = multilocal

l = local
z = other type of government publication
o = government publication -- level undetermined
u = unknown if item is government publication
| = no attempt to code

29 Conference publication:
0 = not a conference publication
1 = conference publication
| = no attempt to code

30 Festschrift:
0 = not a festschrift
1 = festschrift
| = no attempt to code

31 Index:
0 = no index
1 = index present
| = no attempt to code

32 Undefined (since 1990) (Earlier records may contain the values 0 or 1)
= Undefined
| = no attempt to code

33 Literary form:
0 = not fiction (not further specified)
1 = fiction (not further specified)
c = comic strips
d = dramas
e = essays
f = novels
h = humor, satires, etc.
i = letters
j = short stories
m = mixed forms
p = poetry
s = speeches
u = unknown
| = no attempt to code

34 Biography:
= no biographical material
a = autobiography
b = individual biography
c = collective biography
d = contains biographical information
| = no attempt to code

35-37 Language:
A three-letter code. For example: eng fre ger spa rus ita

(For a full list of codes used in these positions, see the *MARC Code List for Languages*.)

38 Modified record:
= not modified
x = missing characters (because of characters unavailable in MARC character set)
s = shortened
d = "dashed-on" information omitted

r = completely romanized/printed cards in script
o = completely romanized/printed cards romanized
| = no attempt to code

39 Cataloging source:
= national bibliographic agency
c = cooperative cataloging program
d = other sources
u = unknown
| = no attempt to code

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