David F. Bahr

Professor and Head, School of Materials Engineering

Purdue University

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## Education

University of Minnesota, Minneapolis, MN

Ph.D. Materials Science, August 1997.

Thesis: Microprobes of adhesion and fracture in brittle films.

Purdue University, West Lafayette, IN

M.S. in Metallurgical Engineering, August 1993.

Thesis: Effects of molybdenum on pitting corrosion in austenitic stainless steels.

B.S. in Materials Science Engineering, May 1992.

**Experience**

8/12 - Purdue University: School of Materials Engineering

Professor and Head, 8/12-present

Interests in mechanical properties of thin films, micromechanics of deformation, corrosion and environmentally assisted failure in bulk materials and thin films, and general materials reliability.

8/97 – 8/12 Washington State University : School of Mechanical and Materials Engineering

Adjunct Professor, School of Mechanical and Materials Engineering, 8/12 - present

Director, School of Mechanical and Materials Engineering, 8/11- 8/12

Director of Undergraduate Research, University College, Washington State University 8/06-8/11

Professor, Mechanical and Materials Engineering 8/07-

Herman and Brita Lindholm Endowed Chair in Metallurgy 8/07-8/11

Associate Professor 8/02 – 7/07  
Assistant Professor 8/97-7/02

6/96 - 8/96 Sandia National Laboratories, Livermore CA

Professional Intern.

9/93 - 8/97 University of Minnesota : Chemical Engineering and Materials Science

Graduate Research and Teaching Assistant

1/92 - 8/93 Purdue University : School of Materials Engineering

Graduate Research and Teaching Assistant

**Industrial and Expert Witness Consulting**

1/16- Liberty Engineering, Downers Grove, IL

05/15-1/16 Printpack, Bloomington IN

06/14 – 11/15 Helmer, Martins, Rice & Popham Co., L.P.A; Louisville, KY

01/13-02/13 Rotometrics, Eureaka, MO

10/06-12/06 Preco Electronics, Boise, ID

4/04 – 8/04 Advanced Silicon Materials, Butte, MT

6/02 – 9/02 eV Products, Saxonburg, PA

9/00 – 2/01 Spur Industries Inc., Spokane, WA

9/99 - 3/00 Potlatch Corporation, Lewiston, ID

8/99 - 4/00 Advanced Silicon Materials Inc., Moses Lake, WA

1/01- 12/01 Advanced Silicon Materials Inc., Moses Lake, WA  
10/97 – 1/01 Liberty Engineering, Downers Grove, IL

**Courses Taught (total of 53 undergrad semesters, 15 grad semesters)**

At Purdue:

*Senior thesis II:* MSE 440 – 2nd semester senior thesis course (S20)

*Materials: The foundation of society:* ENRG 103 – 1 credit survey course (S19)

*Materials Processing Laboratory:*  MSE 367 – junior lab course (S13, S14, S15)

*Deposition Processing and Thin Films:* MSE 548 – senior/grad lecture (F13, F15)

*Mechanical Response of Materials:* MSE 382 – junior lecture course (S16)

*Failure Analysis:* MSE 597FA – senior/grad lecture (F17, F19)

*Lean Manufacturing –* MSE 597L – senior/grad lecture, distance delivery, co-instructor (S18, S19)

At Washington State University

*Structure : Properties Laboratory* : MSE 320 – Junior laboratory course (F97,F98,F99, F00, F01, F02, F08, F09)

*Introduction to Materials Science* : MSE 301 (pre 2005) / 201 (post 2005) – Introductory course for MSE and ME majors (Sum98, Sum99, Sum00, F06)

*Electronic Materials* : MSE 302 – Introductory course for MSE and EE’s (S98, S99, F99, S00, S01, F03, S06)

*Microscopic Analysis of Solid Surfaces* : MatSci 571 – Two weeks of a team taught course for graduate students, nanomechanical testing methods. (S98, S00, S03, S06, S07, S08,S11,S12)

*Introduction to Materials* : MSE 110 – Freshman introductory course. (F98, F99, F00, F03, F04, F08, F09, F10)

*Kinetics* : MSE 316 – Junior level course on diffusion, phase transformations, and corrosion. (S99, S09)

*Materials Characterization* : MSE 471 (Sum 99, Sum 00, Sum 01, Sum 02, Sum 03, Sum 04, Sum 05, Sum 06)

*Materials: The Foundation of Science and Technology* : MSE 440 (Tier III capstone) (F 00, F01, S02, S03, S04, S06)

*Thin Films*: MSE 517 (S02, S04, S06, S08, S10, S12) – Thin film deposition, structure, and properties

*Advanced Materials Science*: MSE 505 (F02,F04, F05, F10) – Graduate overview course on advanced topics

*Senior Thesis*: MSE 425/426 (F07, S08, S11, F11) – Independent year long projects focused on student research under faculty direction.

*Undergraduate Research Skills*: UColl 497 (S12) – 1 credit research skills course for general STEM students early in their university education.

**New Courses Developed (5 total) and first offered**

*At Washington State Univeristy*

Materials Characterization : MSE 471 (Sum 99)

Materials: The Foundation of Science and Technology : MSE 440 (Tier III capstone) (F00)  
Thin Films: MSE 517 (S02)

Advanced Materials Science: MSE 505 (F02)

Undergraduate Research Skills: UColl 497 (S12)

*At Purdue University*

Failure Analysis: MSE 597FA (F17)

**Professional Societies & Service**

*Member* of ASM International; TMS, Alpha Sigma Mu, Materials Research Society, ASEE, AAAS

*Symposium Organizer*:

Deformation in Small Volumes, TMS Annual Meeting, 2002.

Mechanical Properties Derived From Nanostructuring, MRS Spring Meeting 2003.

Fundamentals of Nanoindentation and Nanotribology III, MRS Fall Meeting 2004.

Mechanical Properties of Nanostructured Materials – Experiments and Modeling, MRS Spring   
Meeting 2005.

Deformation and Fracture, from Nano to Macro, a Symposium in Honor of Prof. W.W. Gerberich’s 70th Birthday, TMS Annual Meeting 2006.

Deformation and Fracture at the Nano Scale, European Conference of Fracture 16, July 2006

Dislocations: 75 years of deformation mechanisms, TMS Annual Meeting 2009

Materials Education Development and Outreach, from K-Grad, MRS Fall Meeting 2010

Hardness Across the Multi-scales of Structure and Loading Rate, MS&T 2011

Properties and Processes at the Nanoscale─Nanomechanics of Material Behavior, MRS Fall Meeting 2011

Tribology and Mechanical Behavior of Coatings and Engineered Surfaces, ICMCTF, 2012-2014

Mechanical Behavior of Green Materials, MS&T 2013.

Multiscale Approaches to Hydrogen-assisted Degredation of Metals, TMS Annual Meeting 2014

Strength and Failure at the Micro- and Nanoscale; from Fundamentals to Applications, MRS Fall Meeting 2015

*Conference Organizer:*

Nanomechanical Testing in Materials Research and Development, ECI Conferences, Barga, Italy, Oct. 11-16 (2009)

*Professional Committee Membership and Leadership* –

TMS Board of Directors, Membership and Student Affairs, 3/12-3/15

ASM/TMS Joint Mechanical Behavior Committee member 10/99- present, Vice Chair 10/02-9/04, Chair 10/04-9/06

TMS Nanomechanical Behavior of Materials Committee, member 2/02- present

TMS Student Affairs Committee 3/04-3/06

TMS Membership and Student Affairs Committee, 3/06- , Vice Chair 2/08-3/12, Chair 3/12-

Materials Advantage Committee, member 3/04 - , Vice Chair 10/06-9/07, Chair 9/07-10/08

TMS Public and Governmental Affairs Committee, member 2/05 – present

MRS Intersociety Interactions Subcommittee member 4/02-12/02

MRS Web Subcommittee member 1/03 – 11/10 , Chair 10/03- 4/06

ASM International Materials Review Board Member, 10/05-

MRS Nanoscale Informal Science Education Subcommittee member, 12/05-

CUR (Council on Undergraduate Research) councilor for Engineering division, 2017-2019

**Reviewership and editorial duties**

*Editor in Chief*

MRS Advances (Fall 2015-present)

*Associate Editor*

Journal of Engineering Materials and Technology (2008- 2011)

*Editorial Board of Review*

Metallurgical Transactions A ( Key Reader 2003-present)

Metallurgical Transactions A, Chair, Joint Board of Review (2014-2016)

International Materials Reviews (2006-2014)

*Reviewer*

Journal of Materials Research, Journal of the Electrochemical Society, Langmuir, Electrochemica Acta, Journal of Materials Science, Materials Science and Engineering A, Thin Solid Films, Nature Materials, Scripta Materialia, Experimental Mechanics, Applied Surface Science, Materials Today, Journal of Applied Physics, International Journal of Mechanical Sciences, Applied Physics A, Strain, Journal of Physics D: Applied Physics, Holzforschung, Journal of Nanoengineering and Nanosystems, Journal of Testing and Evaluation, Philosophical Magazine A, Philosophical Magazine Letters, Corrosion Science, Nature Communications, Carbon, Smart Materials and Structures, Sensors and Actuators A, Proceedings of the National Academy of Sciences

*Proposal reviewer*:

National Science Foundation, US Department of Energy, Petroleum Research Fund, Oak Ridge SHARE program, Sandia – Los Alamos CINT (Panel Chair 2010-2011), Idaho State Board of Education Grant Program, Kentucky Science and Engineering Foundation, Deutsche Forschungsgemeinschaft  (German Research Foundation), Natural Science and Engineering Research Council of Canada, Research Grants Council of Hong Kong, Swiss National Science Foundation

*External Advisory Board*:

University of Wisconsin Materials Research Science and Engineering Center, 2008-2010

University of Kentucky: Chemical Engineering and Materials Science, 2013 – 2017

Michigan Technological University: Metallurgical and Materials Engineering, 2015-

University of Minnesota: Chemical Engineering and Materials Science, 2016-

*External Thesis Review Committee:*

Hong Kong Univeisty of Science and Technology, Mechanical Enginering (2011)

**University Service**

Chair, Purdue University Chemical Engineering Head Search Committee, 2015-2016

Member, WSU Provost’s Advisory Committee on Tenure and Promotion, 2010-2011

Member, WSU CEA Dean’s Research Committee, S05 – S10

Member, WSU Graduate Education Commission, S05- S06

Member, WSU Undergraduate Research Committee, F04-S06

Advisor to Freshmen – Sophomore MSE majors at WSU, S2000 - 2012

Advisor to ASM/TMS Material Advantage student chapter, 1999- 2012

Co-Advisor (with D.P. Field) to MRS Student Chapter

Chair, MME Faculty Search Committee, 2006-2007

Committee member for 9 faculty searches, CEA Dean’s Search Committee, laboratory equipment committee, ABET accreditation, MME Graduate Studies Committee

Recruiting trips to area high schools (Moscow, S99; Richland, F99; Kennewick, F99; Olympia, F03, Tacoma, S06; Seattle, S06)

WSU Prospective Student Phone-a-thon, 1998, 2000, 2001

**Awards**

Brimacombe Medalist – TMS, March 2016

Fellow, American Association for the Advancement of Science (AAAS), February 2016

Distinguished Service Award, TMS Structural Materials Division, March 2013

Fellow, ASM International, October 2012

Outstanding MSE Alumni Award, Purdue University, April 2011

Outstanding Faculty Advisor - Graduate and Professional Student Association of WSU, April 2011

Anjan Bose Outstanding Research Award – WSU College of Engineering and Architecture, April 2009

Robert Lansing Hardy Award – TMS, February 2007

Best Paper Award – MEMS Division of ASME, ASME International Mechanical Engineering Conference and Exposition, Nov. 2005

Outstanding Teaching Faculty – WSU College of Engineering and Architecture, April 2004

Outstanding Researcher – School of Mechanical and Materials Engineering, April 2004

Bradley Stoughton Award for Young Teachers – ASM International, October 2003

Outstanding WSU MSE Faculty Teaching Award, April 2003

Best Paper Award- American Society of Engineering Education Materials Division, 2002 Annual Meeting July 2002

Outstanding Researcher – School of Mechanical and Materials Engineering, April 2002

Presidential Early Career Award for Scientists and Engineers (PECASE) October 2000

Department of Energy – Defense Programs Early Career Award October 2000

Outstanding WSU MSE Faculty Teaching Award, April 1999

University of Minnesota Graduate School Fellowship, September 1993

Purdue Materials Science and Engineering - Magoon Award for Teaching Excellence, 1993

Purdue University - Kneale Award for Scientific Writing, May 1992

**Books, Book Chapters, and Editor**

1. Comprehensive Structural Integrity, Chapter 8.13, *Nanoindentation methods in interfacial fracture testing***,** by A. A. Volinsky, D. F. Bahr, M. D. Kriese, N. R. Moody, and W. W. Gerberich, Elsevier Science, Amsterdam, The Netherlands (2003)
2. Mechanical Properties Derived from Nanostructuring Materials, Materials Research Society Symposium Proceedings, vol. 778, eds. David F. Bahr, Harriet Kung, Neville R. Moody, and Kathryn J. Wahl , Materials Research Society, Warrendale PA (2003)
3. Fundamentals of Nanoindentation and Nanotribology III, , Materials Research Society Symposium Proceedings, vol. 841, eds. Kathryn J. Wahl, Norbert Huber, Adrian B. Mann, David F. Bahr, and Y.-T. Cheng , Warrendale, PA (2005).
4. Mechanical Properties of Nanostructured Materials—Experiments and Modeling*,* Materials Research Society Symposium Proceedings, vol. 880, edited by J.G. Swadener, E. Lilleodden, S. Asif, D. Bahr, and D. Weygand, Warrendale, PA (2005)
5. Springer Handbook of Experimental Solid Mechanics, ISBN 978-0-387-26883-5, Chapter 16, *Nanoindentation*, by D.F. Bahr and D.J. Morris, editor William N. Sharpe, Jr., Springer , New York, (2008).
6. Computational Methods for Microstructure-Property Relationships, *Challenges below the grain scale and multiscale models*, by Hussein M. Zbib and David F. Bahr, editors S. Gosh and D. Dimiduk, pp. 555-590 (2011) DOI: 10.1007/978-1-4419-0643-4\_15
7. Materials Education Development and Outreach: From K-Grad, Materials Research Society Symposium Proceedings, vol. 1320, electronic proceedings, edited by D.F. Bahr, M. Glass, K. Jones, Warrendale PA (2011)
8. Properties and Processes at the Nanoscale – Nanomechanics of Material Behavior, Materials Research Society Symposium Proceedings, vol. 1424, edited by Peter Anderson, Neville Moody, David Bahr, and Ralph Spolenak, Warrendale PA (2012)

**Refereed Journal Publications (Web of Science Researcher ID A-6521-2012 / Google Scholar David F. Bahr / ORCID 0000-0003-2893-967X)**

##### Pile up and Plastic Zone Size Around Indentations D.F. Bahr and W.W. Gerberich, Metallurgical and Materials Transactions, vol. 27A, pp. 3793 - 3800 (1996)

1. *Characterization of DC Jet CVD Diamond Films on Molybdenum*D.F. Bahr, D. Bucci, L.S. Schradler, J.A. Last, J. Heberlein, E. Pfender and W.W. Gerberich, Diamond and Related Materials, vol. 5, pp. 1462-1472 (1996)
2. *Adhesion and Acoustic Emission Analysis of Failures in Nitride Films with a Metal Interlayer*D.F. Bahr, J.W. Hoehn, N.R. Moody and W.W. Gerberich, Acta Materiala, vol. 45, pp. 5163-5175 (1997)

###### Mechanical Behavior of Passivating Surfaces Under Potentiostatic Control D.F. Bahr, J.C. Nelson, N. Tymiak and W.W. Gerberich, Journal of Materials Research, vol. 12, pp. 3345-3354 (1997)

1. *Relationships Between Acoustic Emission and Energy Released During Failure Events*   
   D.F. Bahr and W.W. Gerberich, Journal of Materials Research, vol. 13, pp. 1065-1074 (1998)
2. *Elastic Loading and Elastoplastic Unloading from Nanometer Level Indentations for Modulus Determination*W.W. Gerberich, W. Yu, D. Kramer, A. Strojny, D. Bahr, E. Lilleoden, and J. Nelson, Journal of Materials Research, vol. 13, pp. 421-439 (1998)
3. *Non-linear Deformation Mechanisms During Nanoindentation*D.F. Bahr, D.E. Kramer and W.W. Gerberich, Acta Materialia, vol. 46, pp. 3605-3617 (1998)
4. *Microindentation Method For In-Situ Stress Measurements In Precipitated Iron Sulfate Films*N.I. Tymiak, J.C. Nelson, D.F. Bahr and W.W. Gerberich, Corrosion Science, vol. 40, pp. 1953-1975 (1998)
5. *Yield Strength Predictions From the Plastic Zone Around Nanocontacts*D. Kramer, H. Huang, M. Kriese, J. Robach, J. Nelson, A. Wright, D. Bahr, E. Lilleodden, and W.W. Gerberich, Acta Materialia, vol. 47, pp. 333-343 (1998)
6. *Mechanical Deformation of PZT Thin Films for MEMS Applications*D.F. Bahr, J.S. Robach, J.S. Wright, L.F. Francis, and W.W. Gerberich, Materials Science and Engineering A, vol. 259, pp. 126 – 131 (1999)
7. *Energy Considerations Regarding Yield Points During Indentation*D.F. Bahr, D.E. Wilson, and D.A. Crowson, Journal of Materials Research, vol. 14, pp. 2269-2275 (1999)
8. *Nanoindentation-Induced Defect-Interface Interactions: Phenomena, Methods and Limitations*W. W. Gerberich, D. E. Kramer, N. I. Tymiak, A. A. Volinsky, D. F. Bahr and M. D. Kriese, Acta Materialia, vol. 47 , pp. 4115-4123 (1999)
9. *Grain Growth and Mechanical Properties of Bulk Polycrystalline Silicon*R.W. Fancher, C.M. Watkins, M.G. Norton, D.F. Bahr And E.W. Osborne, Journal of Materials Science, vol. 36, pp. 5441-5446, (2001)
10. *Effect of Thermal Treatment on Failure Modes in Tungsten Wire*P.P. Bourque, D.F. Bahr, and M.G. Norton, Materials Science and Engineering A, vol. 298, pp. 73-78 (2001)
11. *Plastic Zone Evolution Around Small Scale Indentations*C.L. Woodcock and D.F. Bahr, Scripta Materialia, vol. 43, pp. 783-788 (2000)
12. *Structural and Mechanical Characteristics of Anodic Oxide Films on Titanium*  
    M. Pang, D.E. Eakins, M.G. Norton, and D.F. Bahr, Corrosion, vol. 57, pp. 523-531 (2001)
13. *Fatigue and Fracture in Membranes for MEMS Power Generation*D.F. Bahr, B.T. Crozier, C.D. Richards, and R.F. Richards,Mechanical Properties of Structural Films, STP No. 1413, C.L. Muhlstein and S.B. Brown, Eds., American Society for Testing and Materials, West Conshohocken, PA, pp. 28-36 (2001)
14. *Thin Film Fracture During Nanoindentation Of A Titanium Oxide Film – Titanium System*   
    M. Pang and D.F. Bahr, Journal of Materials Research, vol. 16, pp. 2634-2643 (2001)
15. *Plastic Strain and Strain Gradients at Very Small Indentation Depths*N.I. Tymiak, D.E. Kramer, D.F. Bahr, T.J. Wyrobek, and W.W. Gerberich, Acta Materialia, vol. 49, pp. 1021-1034 (2001).
16. *The Effects Of Hydrogen On Deformation And Cross Slip In A BCC Titanium Alloy*K.R. Morasch and D.F. Bahr, Scripta Materialia, vol. 45, pp. 839-845 (2001)
17. *A Facility for Characterizing the Dynamic Mechanical Behavior of Thin Membranes for MEMS Devices*J.D. Hall, N.E. Apperson, B.T. Crozier, C. Xu, R.F. Richards, D.F. Bahr, and C.D. Richards, Review of Scientific Instruments, vol. 73, pp. 2067-2072 (2002)
18. *Nanoindentation and Orientation Imaging: Probing small volumes and thin films for mechanical properties*D.F. Bahr, K.A. Nibur and K.R. Morasch, Journal of Electronic Materials, vol. 31, pp. 66 - 70 (2002)
19. *Hydrogen and Deformation: Nano- and Microindentation Studies*  
    D.F. Bahr, K.A. Nibur, K.R. Morasch, and D.P. Field, JOM, vol. 55, no. 2, pp. 27-50 (2003)
20. *Fracture of Polycrystalline Silicon*R.C. Brodie and D.F. Bahr, Materials Science and Engineering A, vol. A351, pp. 166-173 (2003)
21. *Indentation Induced Film Fracture in Hard Film – Soft Substrate Systems*D.F. Bahr, C.L. Woodcock, M. Pang, K.D. Weaver, and N.R. Moody, International Journal of Fracture, vol. 119, pp. 339-349 (2003)
22. *Introducing Upper Division Non-Engineering Students to Materials*  
    D.F. Bahr and M.G. Norton, Journal of Materials Education, vol. 25, pp. 71-77 (2003)
23. *Effects of* ***Zn addition and thermal annealing on yield phenomena of CdTe and Cd0.96Zn0.04Te single crystals by nanoindentation***M. Pang, D.F. Bahr, and K.G. Lynn, Applied Physics Letters, vol. 82, pp. 1200-1202 (2003)
24. *Design fabrication and testing of the P3 micro heat engine*   
    S. Whalen, M. Thompson, D. Bahr, C. Richards and R. Richards, Sensors & Actuators: A. Physical, vol. 104, pp. 200-208 (2003)
25. *Mechanical Measurements of Passive Film Fracture on an Austenitic Stainless Steel*D. Rodriguez-Marek, M. Pang, and D.F. Bahr, Metallurgical and Materials Transactions, A. vol. 34A, pp. 1291-1296 (2003)
26. *Microstructural Characterization And Mechanical Reliability Of Interfaces In Piezoelectric Based Microelectromechanical Systems*L.M.R. Eakins, B.W. Olson, C.D. Richards, R.F. Richards, and D.F. Bahr, Thin Solid Films, vol. 441, pp. 180-186 (2003)
27. *Strength Enhancements of Single Crystal Laser Components*  
    K.E. Shafer, D.E. Eakins, D.F. Bahr, M.G. Norton, and K.G. Lynn, Journal of Materials Research, vol. 18, pp. 2537-2539 (2003).
28. *Influence of Structure and Chemistry on Piezoelectric Properties of lead zirconate titanate in a Microelectromechanical Power Generation Application*  
    L.M.R. Eakins, B.W. Olson, C.D. Richards, R.F. Richards, and D.F. Bahr, Journal of Materials Research, vol. 18, pp. 2079-2086 (2003)
29. *Identifying slip systems around indentations in FCC metals*K.A. Nibur and D.F. Bahr, Scripta Materialia, vol. 49, pp. 1055-1060 (2003).
30. *An in-situ TEM study of phase formation in gold-aluminum couples*D.E. Eakins, D.F. Bahr, and M.G. Norton, Journal of Materials Science, vol. 39, pp. 165-171 (2004).
31. *Nanomechanical Properties of Ordered Phthalocyanine Langmuir-Blodgett Layers*  
    Tammy Oshiro, Arnie Backstrom, Anne-Marie Cumberlidge, K.W. Hipps, Ursula Mazur, S.P. Pevovar, D.F. Bahr, and Joanne Smieja, Journal of Materials Research, vol. 19, pp. 1461-1470 (2004).
32. *Efficiency of energy conversion for devices containing a piezoelectric component*Cecilia D. Richards, Michael J. Anderson, David F. Bahr, and Robert F. Richards, Journal of Micromechanics and Microengineering, vol. 14, pp. 717-721 (2004).
33. *High strain behavior of composite thin film piezoelectric membranes*I. Demir, A.L. Olson, J.L. Skinner, C.D. Richards, R.F. Richards, and D.F. Bahr, Microelectronic Engineering, vol. 75, pp. 12-23 (2004).
34. *Dislocations in Yttrium Orthovanadate*D.E. Eakins, J.B. LeBret, M.G. Norton, and D.F. Bahr, Journal of Crystal Growth, vol. 266, pp. 411-414 (2004).
35. *Quantifying improvements in adhesion of platinum films on brittle substrates*M.J. Cordill, N.R. Moody, and D.F. Bahr, Journal of Materials Research, vol. 17, pp. 1818-1825 (2004).
36. *A study of fracture and defects in single crystal YAG*D.E. Eakins, M. Held, M.G. Norton, and D.F. Bahr, Journal of Crystal Growth, vol. 267, pp. 502-509 (2004).
37. *Hydrogen Effects on Dislocations Around Indentations*  
    K.A. Nibur, D.F. Bahr, and B.P. Somerday, TMS Letters, vol. 1, pp. 1-2 (2004).
38. *Recent Developments in Thin Film Adhesion Measurement*M.J. Cordill, D.F. Bahr, N.R. Moody, and W.W. Gerberich, IEEE Transactions on Device and Materials Reliability, vol. 4, pp. 163-168 (2004).
39. *Effects of Microstructure on the mechanical properties of copper films for high aspect ratio structures,*   
    M.J. Cordill, T. Muppidi, N.R. Moody, D.F. Bahr, Microsystem Technologies, vol. 10, pp. 451-455 (2004).
40. *Length Scale Based Hardening Model for Ultra-small Volumes*J.M. Jungk, W.M. Mook, M.J. Cordill, M.D. Chambers, W.W. Gerberich, D.F. Bahr, N.R. Moody, J.W. Hoehn, Journal of Materials Research, vol. 19, pp. 2812-2821 (2004).
41. *Coupling Bulge Testing and Nanoindentation to Characterize Materials Properties of Bulk Micromachined Structures*M.S. Kennedy, A.L. Olson, J.C. Raupp, N.R. Moody, D.F. Bahr, Microsystem Technologies, vol. 11, pp. 298-302 (2005).
42. *The Effects of Plasticity on Adhesion of Hard Films on Ductile Interlayers*  
    M.J. Cordill, N.R. Moody, and D.F. Bahr, Acta Materialia, vol. 53, pp. 2555-2562 (2005).
43. *Examination of Crystal Defects with High kVX-ray Computed Tomography*  
    J.B. LeBret, M.G. Norton, and D.F. Bahr, Materials Letters, vol. 59, pp. 1113-1116 (2005).
44. *Effects of alloy and solution chemistry on the fracture of passive films on austenitic stainless steel*A. Alamr, D.F. Bahr, and Michael Jacroux, Corrosion Science, vol. 48, pp. 925-936 (2006).
45. *Nanomechanical Testing for Fracture of Oxide Films*  
    K.R. Morasch and D.F. Bahr, Journal of Materials Research, vol.20, 1490-1497 (2005)
46. *The Effects of Solid Solution Impurities on Dislocation Nucleation During Nanoindentation*  
    D.F. Bahr and G. Vasquez, Journal of Materials Research, vol. 20, 1947-1951 (2005).
47. *Characterization Of Low Angle Grain Boundaries In Yttrium Orthovanadate*  
    Joel B. Lebret, M. Grant Norton, David F. Bahr, David P. Field, Kelvin G. Lynn, Journal of Materials Science, vol. 40, pp. 3347 – 3353 (2005).
48. *Incorporating Diverse Majors and Backgrounds in Materials Science Research Experience for Undergraduates (REU) Sites*D.F. Bahr and M.G. Norton, Journal of Materials Education, vol. 26, pp. 267 – 272 (2004).
49. *Optimization of electromechanical coupling for a thin-film PZT membrane: I. Modeling*J. Cho, M. Anderson, R. Richards, D. Bahr and C. Richards, Journal of Micromechanics and Microengineering, vol. 15 pp. 1797-1803 (2005)
50. *Optimization of electromechanical coupling for a thin-film PZT membrane: II Experiment*J. Cho, M. Anderson, R. Richards, D. Bahr, C. Richards, Journal of Micromechanics and Microengineering, vol. 15, pp. 1804-1809 (2005)
51. *Environmentally Induced Failure of Gold Jewelry Alloys*  
    Colin C. Merriman, David F. Bahr, and M. Grant Norton, Gold Bulletin, vol. 38, pp. 113-119 (2005).
52. *Effects of alloy and solution chemistry on the fracture of anodic films formed at metastable pitting potentials*A. Alamr, D.F. Bahr, and Michael Jacroux, Corrosion Engineering, Science and Technology, vol. 40, pp. 255-261 (2005)
53. *Nonlinear vibrations of a pre-stressed laminated thin plate*  
    O.I. Crabtree, S. Dj. Mesarovic, R.F. Richards, D.F. Bahr, and C.D. Richards, International Journal of Mechanical Sciences, vol. 48, pp. 451-459 (2006)
54. *Hydrogen effects on dislocation activity in austenitic stainless steel*  
    K.A. Nibur, D.F. Bahr, and B.P. Somerday, Acta Materialia, vol. 54, pp. 2677-2684 (2006).
55. *The Effectiveness of Active Undergraduate Research in Materials Science and Engineering*  
    David F. Bahr and M. Grant Norton, Journal of Materials Education, vol. 28, pp. 127-136 (2006).
56. *A MEMS fabricated flexible electrode array for recording surface field potentials*  
    B.A. Hollenberg, C.D. Richards, R.F. Richards, D.F. Bahr, and D.M. Rector, Journal of Neuroscience Methods, vol. 153, pp. 147-153 (2006)
57. *Analysis of dislocation mechanisms around indentations through slip step observations*  
    K.A. Nibur, F. Akasheh, and D.F. Bahr, Journal of Materials Science, vol. 42 pp. 889-900 (2007).
58. *Mechanical compliance of photolithographically defined vertically aligned carbon nanotube turf*C.M. McCarter, R.F. Richards, S. Mesarovic, C.D. Richards, D.F. Bahr, D. McClain, J. Jiao, Journal of Materials Science, vol. 41, pp. 7872-7878 (2006)
59. *Fabrication and Characterization of a Thermal Switch*T. Wiser, J. Cho, C. Richards, D. Bahr, and R. Richards, Sensors and Actuators A, vol. 133, pp. 55-63 (2007).
60. *An energy method to analyze through thickness thin film fracture during indentation*   
    K.R. Morasch and D.F. Bahr, Thin Solid Films, vol. 515, pp. 3298-3304 (2007)
61. *Characterization and Modeling of a Microcapillary Driven Liquid – Vapor Phase Change Membrane Actuator*  
    S.A. Whalen, C.D. Richards, D.F. Bahr, and R.F. Richards, Sensors and Actuators A, vol. 134, pp. 201-212 (2007)
62. *Efficiency of Energy Conversion by Piezoelectrics*

J.H. Cho, M.J. Anderson, R.F. Richards, D.F. Bahr, C.D. Richards, Applied Physics Letters, 89, 104107, 1-3 (2006)

1. *The effect of design and process parameters on electromechanical coupling for a thin film PZT membrane*  
   Omar Al-Hattamleh, Jeong Cho, Robert F. Richards, David F. Bahr, Cecilia D. Richards, Journal of MicroElectroMechanical Systems, vol. 15, pp. 1715-1725 (2006).
2. *Characterization of a dynamic micro heat engine with integrated thermal switch*L.W. Weiss, K.E. McNeil, C.D. Richards, D.F. Bahr, R.F. Richards, Journal of Micromechanics and Microengineering, vol. 16, pp. S262-S269 (2006).
3. *Adhesion measurements using telephone cord buckles*  
   M.J. Cordill, D.F. Bahr, N.R. Moody, and W.W. Gerberich, Materials Science and Engineering A, vol. 443, pp. 150-155 (2007)
4. *Structural and electrical characterization of PZT on gold for micromachined piezoelectric membranes*  
   M.C. Robinson, D.J. Morris, P.D. Hayenga, J.H. Cho, C.D. Richards, R.F. Richards, D.F. Bahr, Applied Physics A, vol. 85, pp. 135-140 (2006).
5. *A general education course in materials*  
   M.G. Norton and D.F. Bahr, Journal of Materials Education, vol. 28, pp. 239-246 (2006)
6. *Mechanical behavior of a carbon nanotube turf*  
   S. Dj. Mesarovic, C.M. McCarter, D.F. Bahr, H. Radhakrishnan, R.F. Richards, C.D. Richards, D. McClain, and J. Jiao, Scripta Materialia, vol. 56, pp. 157-160 (2007).
7. *Development of noncontact spring constant measurement and deflection characterization of piezoelectric devices*   
   J.H. Cho, R.F. Richards, D.F. Bahr, and C.D. Richards, Journal of Applied Physics*,* vol. 101, pp. 044104 (2007)
8. *Electrostatic shielding in patterned carbon nanotube field emission arrays*

D. McClain, J.F. Wu, N. Tavan, J. Jiao, C.M. McCarter, R.F. Richards, S. Mesarovic, C.D. Richards, D.F. Bahr, Journal Of Physical Chemistry C 111 , pp 7514-7520 (2007)

1. *Complementary characterization techniques for identification of ferroelectric domains in KNbO3 single crystals*A. Bellou and D.F. Bahr, Materials Characterization, vol. 59, pp. 688-692 (2008).
2. *Mechanical behavior assessment of sucrose using nanoindentation*  
   K.J. Ramos and D.F. Bahr, Journal of Materials Research, vol. 22, pp. 2037-2045 (2007).
3. *Dislocation Nucleation and Source Activation during Nanoindentation Yield Points*  
   A.A. Zbib and D.F. Bahr, Metallurgical and Materials Transactions A, vol. 38, pp. 2249-2255 (2007).
4. *The effect of non-uniform chemistry on interfacial fracture toughness*  
   M.S. Kennedy, N.R. Moody, and D.F. Bahr, Metallurgical and Materials Transactions A, vol. 38, pp. 2256-2262 (2007).
5. *Power production by a dynamic micro heat engine with an integrated thermal switch*  
   J.H. Cho, L. W. Weiss, R.F. Richards, D.F. Bahr, and C.D. Richards, Journal of Micromechanics and Microengineering, vol. 17, pp. S217-S223 ( 2007).
6. *The aging of metallic thin films: Delamination, strain relaxation, and diffusion*  
   M.S. Kennedy, N.R. Moody, and D.F. Bahr, JOM, vol. 59, no. 9, pp. 50-53 (2007)
7. *Displacement Amplification in Curved Piezoelectric Diaphragm Transducers*  
   D.J. Morris, D.F. Bahr, and M.J. Anderson, Sensors and Actuators A, vol. 141, pp. 262-265 (2008)
8. *Mechanical properties of cubic zinc carboxylate IRMOF-1 metal-organic framework crystals*  
   D.F. Bahr, J.A. Reid, W.M. Mook, C.A. Bauer, R. Stumpf, A.J. Skulan, N.R. Moody, B.A. Simmons, M.M. Shindel, M.D. Allendorf, Physical Review B, 76, 184106, 7 pages (2007)
9. *Environmental influence on interface interactions and adhesion of Au/SiO2*  
   M.S. Kennedy, N.R. Moody, D.P. Adams, M. Clift and D.F. Bahr, Materials Science and Engineering A, vol. 493, pp. 299-304 (2008). DOI: 10.1016/j.msea.2007.09.081
10. *Molecular dynamic simulation of heat pulse propagation in multiwall carbon nanotubes*Taejin Kim,  Mohamed A. Osman,  Cecilia D. Richards, David F. Bahr,  Robert F. Richards, Physical Review B, vol. 76, 155424, 8 pages (2007). DOI 10.1103/PhysRevB.76.155424
11. *Lumped parameter analysis of an enclosed incompressible squeeze film and a central gas bubble*  
    M. Anderson, C. Richards, R. Richards, D. Bahr, Journal of Fluids Engineering, vol. 130, 021303, 8 pages (2008). DOI 10.1115/1.2829587
12. *Nanoindentaciones Y Ultraestructura En Madera De Eucalyptus Nitens Con Micro Y Meso Grietas*  
    William Gacitua, Aldo Ballerini, Jean Pierre Lasserre, David Bahr, Maderas: Ciencia Y Tecnologia, vol. 9, pp. 259-270, (2007) in Spanish
13. *The coordinated buckling of carbon nanotube turfs under uniform compression*  
    A.A. Zbib, S. Dj. Mesarovic, E.T. Lilleodden, D. McClain, J. Jiao, and D.F. Bahr, Nanotechnology, vol. 19, no. 17, 175704, 7 pages, (2008). DOI:10.1088/0957-4484/19/17/175704
14. *Characterization of flexible ECoG electrode arrays for chronic recording in awake rats*  
    John D. Yeager, Derrick J. Phillips, David M. Rector, and David F. Bahr, J. Neuroscience Methods, vol. 173, pp. 279-285 (2008) DOI: 10.1016/j.jneumeth.2008.06.024
15. *A resonant –frequency tunable extensional mode piezoelectric vibration harvesting mechanism*  
    D.J. Morris, J.M. Youngsman, M.A. Anderson, and D.F. Bahr, Smart Materials and Structures, vol. 17, 065021, 8 pp, (2008) DOI: 10.1088/0964-1726/17/6/065021
16. *Evaluation of contacts for a MEMS thermal switch*  
    J. Cho, C. Richards, D. Bahr, J. Jiao, R. Richards, Journal of Micromechanics and Microengineering, vol. 18, 105012 (2008) DOI: 10.1088/0960-1217/18/10/105012
17. *An intensive “camp” format to provide undergraduates research experiences to first year students*  
    D.F. Bahr and K.O. Findley, Journal of Materials Education, vol. 30, pp. 345-350 (2008)
18. ***Thermocompression bonding of vertically aligned carbon nanotube turfs to metalized substrates***  
    R D Johnson, D F Bahr, C D Richards, R F Richards, D McClain, J Green and J Jiao, Nanotechnology, vol. 20, 065703, 6 pp. (2009) DOI 10.1088/0957-4484/20/6/065703
19. *Pseudoelastic behavior of Cu-Ni composite nanowires*  
    Ioannis N. Mastorakos, Hussein M. Zbib, David F. Bahr, Jessica Parsons, and Mased Faisal, Applied Physics Letters, vol. 94, 043104 (2009) DOI 10.1063/1.3073984
20. *Microstructure and grain growth of polycrystalline silicon grown in fluidized bed reactors*  
    M.M. Dahl, A. Bellou, D.F. Bahr, M.G. Norton, and E.W. Osborne, J. Crystal Growth, vol. 311, pp. 1496-1500 (2009) clearDOI10.1016/j.jcrysgro.2009.01.114
21. *Yield and Deformation in Biaxially Stressed Multilayer Metallic Thin Films,* N. R. Overman, C.T. Overman, H.M. Zbib, D.F. Bahr, Journal of Engineering Materials Technology, vol. 131, 041203 (6 pages) (2009) DOI: 10.1115/1.3183775
22. *Dislocation nucleation and multiplication in small volumes: The onset of plasticity during indentation testing*D.F. Bahr, S.L. Jennerjohn, D.J. Morris, JOM, vol. 61, no. 2, 56-60 (2009) DOI 10.1007/s11837-009-0029-3
23. *Finite element analysis and experimental investigation of the Hertzian assumption on the characterization of initial plastic yield*   
    Li Ma, Dylan J. Morris, Stefhanni L. Jennerjohn, David F. Bahr, Lyle Levine, Journal of Materials Research, vol. 24, pp. 1059-1068 (2009)
24. *Direct observation of plasticity and quantitative hardness measurements in single crystal cyclotrimethylene trinitramine by nanoindentation*Kyle J. Ramos, Daniel E. Hooks, and David F. Bahr, Philosophical Magazine A, vol. 89, pp. 2381-2402 (2009) DOI: 10.1080/14786430903120335
25. *Deformation mechanisms and strength in nanoscale multilayer metallic composites with coherent and incoherent interfaces*Ioannis N. Mastorakos, Hussein M. Zbib, and David F. Bahr, Applied Physics Letters, vol. 94, 173114 (2009) DOI: 10.1063/1.3129166
26. *Analysis of heterogeneous deformation and dislocation dynamics in single crystal micropillars under compression*S. Akarapu, H.M. Zbib, and D.F. Bahr, International Journal of Plasticity, vol. 26, pp.239-257 (2010) DOI: 10.1016/ijplas.2009.06.005
27. *Microstructure-mechanical and chemical behavior relationships in passive films*  
    R.S. Yassar, L. Scudiero, A.S. Alamr, D.F. Bahr and M.G. Norton, Thin Solid Films, vol. 518, pp. 2757-2763 (2010) DOI:10.1016/j.tsf.2009.08.032
28. *Thermal stability and strength of Mo/Pt multilayered films*A. Bellou, L. Scudiero, D.F. Bahr, Journal of Materials Science, vol. 45, pp. 354-362 (2010) DOI10.1007/s10853-009-3943-4
29. *Nanoindentation of compliant substrate systems: Effects of geometry and compliance*  
    Thao D. Nguyen, J.D. Yeager, D.F. Bahr, D.P. Adams, N.R. Moody, Journal of Engineering Materials and Technology, vol. 132, pp 021001 (7 pages) (2010) DOI 10.1115/1.4000230
30. *Evaluation of a thermal interface material fabricated using thermocompression bonding of carbon nanotube turf*A. Hamdan, J. Cho, R. Johnson, J. Jiao, D. Bahr, R. Richards, and C. Richards, Nanotechnology, vol. 21, 015702 (8 pages) (2010) DOI: 10.1088/0957-4484/21/1/015702
31. *Atomistic simulations of nanoindentation in the presence of vacancies*  
    E.K. Njeim, D.F. Bahr, Scripta Materialia, vol. 62, pp 598-601(2010) DOI:10.1016/j.scriptamat.2010.01.006
32. *Microstructural characterization of thin gold films on a polyimide substrate*J.D. Yeager, D.F. Bahr, Thin Solid Films, vol. 518, pp. 5896-5900 (2010) DOI: 10.1016/j.tsf2010.05.070
33. *A Model for an Extensional Mode Resonator Used as a Frequency-Adjustable Vibration Energy Harvester”*J.M. Youngsman, T. Leudeman, D.J. Morris, M.J. Anderson, D.F. Bahr Journal of Sound and Vibration, vol. 329, pp. 277-288 (2010) . DOI:10.1016/j.jsv.2009.09.011
34. *Defect and surface asperity dependent yield during contact loading of an organic molecular single crystal*  
    K.J. Ramos, D.F. Bahr, D.E. Hooks, Philosophical Magazine, vol. 91, pp. 1276-1285 (2011) DOI: 10.1080/14786431003745336
35. *Enhanced actuation and acoustic transduction by pressurization of micromachined piezoelectric diaphragms*D.J. Morris, R.F. Need, M.J. Anderson, D.F. Bahr, Sensors and Actuators A, vol. 161, pp. 164-172 (2010) DOI: 10.1016/j.sna.2010.05.028
36. *Damage of the cell wall during extrusion and injection molding of wood plastic composites*  
    W. Gacitua, D. Bahr, and M. Wolcott, Composites Part A – Applied Science and Manufacturing, vol. 41, pp. 1454-1460 (2010) DOI: 10.1016/j.compositesa.2010.06.007
37. *Influence of Nitrate on Pit Stability in Austenitic Stainless Steels*  
    R.S. Lillard, G. Vasquez Jr., D.F. Bahr, Corrosion, vol. 66, 075004 (12 pages) (2010) DOI: 10.5006/1.3462911
38. *Thermal and mechanical properties of poly(3-hydroxybutyrate-co-3 hydroxyvalerate) /cellulose nanowhiskers composites,*   
    Elena Ten, Joel Turtle, David Bahr, Long Jiang and Michael Wolcott, Polymer, vol. 51 (12) pp. 2652-2660 (2010)clear DOI:10.1016/j.polymer.2010.04.007
39. *Mechanical properties of polycrystalline silicon solar cell feed stock grown via fluidized bed reactors*  
    M.B. Zbib, M.C. Tarun, M.G. Norton, D.F. Bahr, R. Nair, N.X. Randall, E.W. Osborne, Journal of Materials Science, vol. 45, pp. 1560-1566 (2010) DOI: 10.1007/s10853-009-4124-1
40. *Strength and aging behavior of Mo/Pt multilayers*  
    A. Bellou, D.F. Bahr, Journal of Materials Science, vol. 46, pp. 108-116 (2011) DOI: 10.1007/s10853-010-4845-1
41. *Adhesive Properties of Some Fluoropolymer Binders with the Insensitive Explosive 1,2,3-triamino-2,4,6-trinitrobenzene (TATB)*John D Yeager, Andrew M Dattelbaum, Edward B Orler, David F Bahr, Journal of Colloid & Interface Science, vol. 352, pp. 535-541 (2010) DOI:10.1016/j.jcis.2010.08.063
42. *Local and non-local behavior and coordinated buckling of CNT turfs*  
    A. Qiu, D.F. Bahr, A.A. Zbib, A. Bellou, S.Dj. Mesarovic, D. McClain, W. Hudson, J. Jiao, D. Kiener, and M.J. Cordill, Carbon, vol. 49, pp.1430-1438 (2011) DOI: 10.1016/j.carbon.2010.12.011
43. *Strength and strain hardening behavior of Cu-based bilayers and trilayers*A. Bellou, C.T. Overman, H.M. Zbib, D.F. Bahr, A. Misra, Scripta Materialia, vol. 64, pp. 641-644 (2011)DOI:10.1016/j.scriptamat.2010.12.009
44. *Quantitative characterization of carbon nanotube turf topology by SEM analysis*  
    H. Malik, K.J. Stephenson, D.F. Bahr, D.P. Field, Journal of Materials Science, vol. 46, pp. 3119-3126 (2011) DOI: 10.1007/s10853-010-5192-y
45. *Analysis of plastic deformation in nanoscale metallic multilayers with coheaent and incoherent interfaces*  
    H.M. Zbib, C.T. Overman, F. Akasheh, and D. Bahr, International Journal of Plasticity, vol. 27, pp. 1618-1639 (2011) DOI:10.1016/j.ijplas.2011.03.006
46. *Size dependent strength in nanolaminate metallic systems*  
    I. Mastorakos, A. Bellou, D.F. Bahr, and H.M. Zbib, Journal of Materials Research, vol. 26, pp. 1179-1187 (2011) DOI: 10.1557/jmr.2011.120
47. *Time-dependent contact behavior between diamond and a CNT turf*A. Qiu, S.P. Fowler, J. Jiao, D. Kiener, and D.F. Bahr, Nanotechnology, vol. 22, pp. 295702 (2011) DOI: 10.1088/0957-4484/22/29/295702
48. *Probing the strain hardening response of small wear volumes with nanoindentation*M.J. Cordill, N.R. Moody, J.M. Jungk, M.S. Kennedy, W.M. Mook, S.V. Prasad, D.F. Bahr, and W.W. Gerberich, Metallurgical and Materials Transactions A, vol. 42, pp. 2226-2232 (2011) DOI:10.1007/s11661-011-0629-8
49. *Examining Chemical Structure at the Interface Between a Polymer Binder and a Pharmaceutical Crystal with Neutron Reflectometry*John D Yeager, Manish Dubey, Michael J Wolverton, Michael S Jablin, Jaroslaw Majewski, David F Bahr, Daniel E Hooks, Polymer, vol. 52, pp. 3762-3768 (2011) DOI:10.1016/j.polymer.2011.06.031
50. *Fabrication, structure, and performance of a microfabricated gallium electrical switch contact*  
    Yoonkap Kim, Julia A. Reid, and David F. Bahr, Journal of Materials Research, vol. 26, pp. 2428-2437 (2011) DOI: 10.1557/jmr.2011.220
51. *Effect of vacancies on incipient plasticity during contact loading*  
    I. Salehinia, V. Perez, D.F. Bahr, Philosophical Magazine, vol. 92, pp. 550-570 (2012) DOI:10.1080/14786435.2011.628635
52. *Characterization of granular silicon, powders, and agglomerates from a fluidized bed reactor*  
    M.B. Zbib, M.M. Dahl, U. Sahaym, M.G. Norton, E.W. Osborne, and D.F. Bahr, Journal of Materials Science, vol. 47, pp. 2583-2590 (2012) DOI 10.1007/s10853-011-6062-7
53. *The impact of a variety of point defects on the inception of plastic deformation in dislocation free metals*I. Salehinia and D.F. Bahr, Scripta Materialia, vol 66, pp. 339-342 (2012)   
    DOI: 10.1016/j.scriptamat.2011.11.028
54. *Effects of cellulose nanowhiskers on mechanical, dielectric, and rheological properties of poly(3-hydroxybutyrate-co-3-hydroxyvalerate) (PHBV)/cellulose nanowhiskers (CNW) composites*  
    Elana Ten, David F. Bahr, Bin Li, Long Jiang, and Michael P. Wolcott, Industrial& Engineernig Chemistry Research, vol 51, pp. 2941-2951 (2012) , DOI: 10.1021/ie2023367
55. *A new acoustic transducer with a pressure-deformed piezoelectric diaphragm*  
    A.S. Wixom, M.J. Anderson, D.F. Bahr, and D.J. Morris, Sensors and Actuators A, vol. 179, pp. 204-210 (2012) DOI:10.1016/j.sna.2012.03.001
56. *Adabidopsis fiber-reduced (SND1/NST1) mutants: nanoindentation probing of mechanical properties in distinct cell wall types*  
    C.L. Cardenas, H. Yang, C. Ki, L.B. Davin, D. Bahr, N.G. Lewis, Pharmaceutical Biology, vol. 50, pp. 583-583 (2012)
57. *The role of probe shape on the initiation of metal plasticity in nanoindentation*Li Ma, Dylan J. Morris, Stefhanni L. Jennerjohn, David F. Bahr, and Lyle E. Levine, Acta Materialia, vol. 60, pp. 4729-4739 (2012) DOI:10.1016/j.actamat.2012.050026
58. *Effect of solute hydrogen on toughness of feedstock polycrystalline silicon for solar cell applications*M.B. Zbib, M.G. Norton, and D.F. Bahr, Scripta Materialia, vol 67, pp. 756-759 (2012) DOI:10.1016/j.scriptamat.2012.07.032
59. *Deformation mechanisms, size effects, and strain hardening in nanoscale metallic multilayers under nanoindentation*S. Shao, H.M. Zbib, I.N. Mastorakos, D.F. Bahr, Journal of Applied Physics, vol. 112 pp. 044307-044307-11 (2012) DOI: 10.1063/1.4748149
60. *Inception of plasticity in copper single crystal in presence of stacking fault tetrahedra*I. Salehinia and D.F. Bahr, Materials Science and Technology, vol. 28, pp. 1141-1146 (2012)

DOI: 10.1179/1743284712Y.0000000014

1. *The mechanical response of core-shell structures for nanoporous metallic materials*  
   N. Abdolrahim, D.F. Bahr, B. Revard, C. Reilly, J. Ye, T.J. Balk, and H.M. Zbib, Philosophical Magazine, vol 93, pp. 736-748 (2013) DOI:10.1080/14786435.2012.731528
2. *Crystallographic orientation and indenter radius effects on the onset of plasticity during nanoindentation*  
   Samantha K. Lawrence, David F. Bahr, and Hussein M. Zbib, Journal of Materials Research, vol. 27, pp. 3058-3065 (2012) DOI:10.1557/jmr.2012.368
3. *The effect of crystal orientation on the stochastic behavior of dislocation nucleation and multiplication during nanoindentation*I. Salehinia, S.K. Lawrence and D.F. Bahr, Acta Materialia, vol. 61, pp. 1421-1431 (2013) DOI:10.1016/j.actamat.2012.11.019
4. *The role of density in the mechanical response of CNT turfs*  
   Anqi Qiu and David F. Bahr, Carbon, vol. 55, pp. 335-342 (2013) DOI: 10.1016/j.carbon.2012.12.073
5. *Effect of interfaces in the work hardening of nanoscale multilayer metallic composites during nanoindentation: a molecular dynamics investigation*S. Shao, H.M. Zbib, I. Mastorakos, D.F. Bahr, Journal of Engineering Materials And Technology, vol. 135, pp. 021001 (2013) DOI:10.1115/1.4023672
6. *Deformation and fracture of a mudflat-cracked laser-fabricated oxide on Ti*S.K. Lawrence, D.P. Adams, D.F. Bahr, and N.R. Moody, Journal of Materials Science, vol. 48, pp. 4050-4058 (2013) DOI 10.1007/s10853-013-7217-9
7. *Phenomenological constitutive model for a CNT turf*H. Radhakrishnan, S. Dj. Mesarovic, A. Qiu, and D.F. Bahr, International Journal of Solids and Structures, vol. 50, pp. 2224-2230 (2013) DOI 10.1016/j.ijsolstr.2013.03.025
8. *Variation in the nanoindentation hardness of platinum*  
   M.R. Maughan, H.M. Zbib, and D.F. Bahr, Journal of Materials Research, vol. 28, pp. 2819-2828 (2013) DOI 10.1557/jmr.2013.285
9. *Mechanical and electromechanical behavior of oxide coatings grown on stainless steel 304L by nanosecond pulsed laser irradiation*  
   Samantha K. Lawrence, David P. Adams, David F. Bahr, and Neville R. Moody, Surface and Coatings Technology, vol. 235, pp. 860-866 (2013 ) DOI 10.1016/j.surfcoat.2013.09.013
10. *Mechanical behavior of FCC single crystals at finite temperatures in the presence of point defects*I. Salehinia and D.F. Bahr, Materials Science and Engineering A, vol. 588, pp. 340-346 (2013) DOI:10.1016/j.msea.2013.09.059
11. *Multiscale modeling and simulation of deformation in nanoscale metallic multilayer systems*  
    Niaz Abdolrahim, Hussein M. Zbib, and David F. Bahr, International Journal of Plasticity, vol. 52, pp. 33-50 (2014) DOI 10.1016/j.ijplas.2013.04.002
12. *Stochastic effects in plasticity in small volumes*S. Shao, N. Abdolrahim, D.F. Bahr, G. Lin, H.M. Zbib, International Journal of Plasticity, vol. 52, pp. 117-132 (2014) DOI:10.1016/j.ijplas.2013.09.005
13. *Crystal orientation effect on dislocation nucleation and multiplication in FCC single crystal under uniaxial loading*  
    I. Salehinia and D.F. Bahr, International Journal of Plasticity, vol. 52, pp. 133-146 (2014) DOI:10.1016/j.ijplas.2013.04.010
14. *The void nucleation strengths of the Cu-Ni-Nb nanoscale metallic multilayers under high strain rate tensile loadings*  
    S. Shao, H.M. Zbib, I.N. Mastorakos, D.F. Bahr, Computational Materials Science, vol. 82, pp. 435-441 (2014) DOI: 10.1016/j.commatsci.2013.09.036
15. *Fracture behavior of granular polycrystalline silicon using micro*-*scale and macro-scale indentation techniques*Mohamad B. Zbib and David F. Bahr, Metallurgical and Materials Transactions E, vol. 1, pp. 20-26 (2014) DOI:10.1007/s40553-013-0002-5
16. *Elastic behavior of a core*-*shell metal-carbon nanotube composite foam*  
    Kassiopeia A. Smith, Mohamad B. Zbib, David F. Bahr, and Maxime J-F. Guinel, MRS Communications, vol. 4, pp. 77-81 (2014) DOI:10.1557/mrc.2014.6
17. *Molecular dynamics simulations of plastic deformation in Nb/NbC multilayers*I. Salehinia, J. Wang, D.F. Bahr, and H.M. Zbib, International Journal of Plasticity, vol. 59, pp. 119-132 (2014) DOI:10.1016/j.iplas.2014.03010
18. *Precipitation strengthening in nanocomposite Cr/Cu-Cr multilayer films*P.C. Wo, N. Abdolrahim, Y.F. Zhu, I.N. Mastorakos, D.F. Bahr, and H.M. Zbib, Philosophical Magazine vol. 95, pp. 1780-1794 (2014) DOI: 10.1080/14786435.2014.904056
19. *The effect of interfacial imperfections on plastic deformation in nanoscale metallic multilayer composites*N. Abdolrahim, I.N. Mastorakos, S. Shao, D.F. Bahr, H.M. Zbib, Computational Materials Science, vol. 86, pp. 118-123 (2014) DOI: 10.1016/j.commatsci.2014.01.045
20. *Elevated temperature dependence of hardness in tri-metallic nano-scale metallic multilayer systems*R.L. Schoeppner, N. Abdolrahim, I. Salehinia, H.M. Zbib, D.F. Bahr, Thin Solid Films, vol. 571, pp. 247-252 (2014) DOI: 10.1016/j.tsf.2014.05.031
21. *Wear behavior of Au-ZnO Nanocomposite films for electrical contacts*R.L. Schoeppner, D.F. Bahr, H. Jin, R.S. Goeke, N.R. Moody, S.V. Prasad, Journal of Materials Science, vol. 49, pp. 6039-6047 (2014) DOI: 10.1007/s10853-014-8326-9
22. *Modification of the mechanical properties of carbon nanotube arrays using electron irradiation induced oxidation*Anqi Qiu and David F. Bahr, Meccanica, vol. 50, pp. 575-583 (2015) DOI 10.1007/s11012-014-9956-3
23. *Statistical quantification of the impact of surface preparation on yield point phenomena in nickel*  
    S.K. Lawrence, H.M. Zbib, M.J. Cordill, S. Wuster, D.F. Bahr, Metallurgical and Materials Transactions A, vol. 45, pp. 4307-4315 (2014) DOI: 10.1007/s11661-014-2382-2
24. *Grain boundary contributions to hydrogen-affected plasticity in Ni-201*S.K. Lawrence, B.P.Somerday, N.R. Moody, and D.F. Bahr, JOM, vol. 66, pp. 1383-1389 (2014) DOI: 10.1007/s11837-014-1062-4
25. *Dislocation activity under nanoscale contacts prior to discontinuous yield*M.R. Maughan and D.F. Bahr, Materials Research Letters, vol. 3, pp. 58-64 (2015) DOI: 10.1080/21663831.2014.961663
26. *Enhanced hardness in epitaxial TiAlScN alloy thin films and rocksalt TiN/(Al,Sc)N superlattices*Bivas Saha, Samantha K. Lawrence, Jeremy L. Schroeder, Jens Birch, David F. Bahr and Timothy D. Sands, Applied Physics Letters, vol. 105, pp. 151904 (5 pages) (2014) DOI: 10.1063/1.4898067
27. *A stochastic crystal plasticity framework for deformation in micro-scale polycrystalline materials*H. Askari, M.R. Maughan, N. Abdolrahim, D.F. Bahr, H.M. Zbib, International Journal of Plasticity, vol. 68, pp. 21-33 (2015) DOI: 10.1016/j.ijplas.2014.11.001
28. *Coherent interfaces increase strain hardening behavior in tri-component nanoscale metallic multilayer thin films*R.L. Schoeppner, J.M. Wheeler, J. Zechner, J. Michler, H.M. Zbib, and D.F. Bahr, Materials Research Letters, vol. 3, pp. 114-119 (2015) DOI:10.1080/21663831.2014.995380
29. *Improved electro-mechanical performance of gold films on polyimide without adhesion layers*B. Putz, R.L. Schoeppner, G. Oleksandr, D.F. Bahr, and M.J. Cordill, Scripta Materialia, vol. 102, pp. 23-26 (2015) DOI:10.1016/j.scriptamat.2015.02.005
30. *Jump Starting Research: Pre-Research STEM Programs*  
    K. R. Schneider, D.F. Bahr, S. Burkett, J. Lustch, S. Pressley, N. VanBennekom, Journal of College Science Teaching, vol. 45, no. 5, pp. 13-19 (2016).
31. *Nanomechanical testing technique for millimeter-sized and smaller molecular crystals*  
    Michael R. Maughan, Teresa Carvajal, David F. Bahr, International Journal of Pharmaceutics, vol. 30, pp. 324-330 (2015) DOI: 10.1016/ijpharm.2015.03.062
32. *New pulverization parameter derived from indentation and dynamic compression of brittle microspheres*M.B. Zbib, N.D. Parab, W.W. Chen, and D.F. Bahr, Powder Technology, vol. 283, pp. 57-65 (2015) DOI: 10.1016/j.powtec.2015.04.066
33. *Effects of applied strain on pileup morphology during quasi-static and dynamic nanoindentation of cyclic olefin copolymers*Nannan Tian and David F. Bahr, Journal of Materials Research, vol. 30, pp. 1779-1787 (2015) DOI:10.1557/jmr.2015.123
34. *The nanomechanical behavior of a graphite nanoplatelet/polycarbonate nanocomposite*Nannan Tian, Tian Liu, Wei-Hong Zhong, David F. Bahr, Polymer Testing, vol 47, pp. 87-91 (2015) DOI: 10.1016/j.polymertesting.2015.08.007
35. *Discontinuous yield behaviors under various pre-strain conditions in metals with different crystal structures*  
    M.R. Maughan and D.F. Bahr, Materials Research Letters, vol. 4, pp. 83-89 (2016) DOI:10.1080/21663831.2015.1121166
36. *Environmental resistance of oxide tags fabricated on 304L stainless steel via nanosecond pulsed laser irradiation*S.K. Lawrence, D.P. Adams, N.R. Moody, and D.F. Bahr, Surface and Coatings Technologies, vol. 285, pp. 87-97, (2016) DOI:10.1016/j.surfcoat.2015.11.021
37. *Effect of accelerated aging on dental zirconia-based materials*Grace M. DeSouza, Angelica Zykus, Reza R. Ghahnavyeh, Samantha K. Lawrence, David F. Bahr, Journal of the Mechanical Behavior of Biomedical Materials, vol. 65, pp. 256-263 (2017) DOI: 10.1016/j.jmbbm.2016.08.023
38. *The influence of cellulose nanocrystals on the microstructure of cement paste*Yizhen Cao, Nannan Tian, David Bahr, Pablo D. Zavattieri, Jeffery Youngblood, Robert J. Moon, Jason Weiss, Cement and Concrete Composites, vol. 74, pp. 164-173 (2016).   
    DOI: 10.1016/j.cemconcomp.2016.09.008
39. *The mechanical properties of minimally processed RDX*Matthew R. Taw and David F. Bahr, Propellants, Explosives, Pyrotechnics, vol. 42, pp. 659-664 (2017) DOI: 10.1002/prep.201600143
40. *Age-hardening in a two component immiscible nanolaminate metal system*C.E. Kim, R.M. Rahimi, T.L. Maxwell, T.J. Balk, and D.F. Bahr, Scripta Materialia, vol. 136, pp. 33-36 (2017) DOI: 10.1016/j.scriptamat.2017.03.037
41. *The effects of intrinsic properties and defect structures on the indentation size effect in metals*M.R. Maughan, A.A. Leonard, D.D. Stauffer and D.F. Bahr, Philosphical Magazine, vol. 97, pp. 1902-1920 (2017) DOI: 10.1080/14786435.2017.1322725
42. *Layer thickness dependent strain rate sensitivity of Cu/amorphous CuNb multilayer*Z. Fan, Y. Liu, S. Xue, R. M. Rahimi, D. F. Bahr, H. Wang, X. Zhang, Applied Physics Letters, vol. 110, 161905 (2017) DOI: <http://dx.doi.org/10.1063/1.4980850>
43. *Nanomechanics and Testing of Core-Shell Composite Ligaments for High Strength, Light Weight Foams*Aiganym Yermembetova, Raheleh M. Rahimi, Chang-Eun Kim, Jack L. Skinner, Jessica M. Andriolo, John P. Murphy and David F. Bahr, MRS Advances, vol. 2, pp3577-3583 (2017) DOI: 10.1557/adv.2017.480
44. *The effect of size and composition on the strength and hardening of Cu–Ni/Nb nanoscale metallic composites*Ioannis N. Mastorakos, Rachel L. Schoeppner, Brian Kowalczyk and David F. Bahr, Journal of Materials Research, vol. 32, pp. 2542-2550 (2017) DOI: 10.1557/jmr.2017.213
45. *Substrate cracking in Ti-6Al-4V driven by pulsed laser irradiation and oxidation*  
    Hector M. Espejo and D.F. Bahr, Surface and Coatings Technology, vol. 322, pp. 46-50 (2017) DOI: [10.1016/j.surfcoat.2017.05.001](https://doi.org/10.1016/j.surfcoat.2017.05.001" \t "doilink)
46. *Crack incubation in shot peened AA7050 and mechanism for fatigue enhancement*D. Chadwick, S. Ghanbari, D.F. Bahr, and M.D. Sangid, Fatigue & Fracture of Engineering Materials & Structures, vol 41, pp. 71-83 (2018) DOI: 10.1111/ffe.12652
47. *Uncovering the thermo-kinetic origins of phase ordering in mixed-valence antimony tetoxide by first principles modeling*Chang-Eun Kim, Su-Hyun Yoo, David F. Bahr, Catherine Stampfl, and Aloysius Soon, Inorganic Chemistry, vol. 56, pp. 6545-6550 (2017) DOI: 10.1021/acs.inorgchem.7b00661
48. *The mechanical properties of as-grown noncubic organic molecular crystals assessed by nanoindentation*M.R. Taw, J.D. Yeager, D.E. Hooks, T.M. Carvajal, and D.F. Bahr, Journal of Materials Research, vol. 32, pp. 2728-2737 (2017) DOI: 10.1557/jmr.2017.219
49. *New insights into nanoindentation based adhesion testing*A. Kleinbichler, M.J. Pfeifenberger, J. Zechner, N.R. Moody, D.F. Bahr, and M.J. Cordill,JOM, vol. 69, pp. 2237-2245 (2017). DOI: 10.1007/s11837-017-2496-2
50. *Nanoindentation of HMX and Idoxuridine to determine mechanical similarity*Alexandra C. Burch, John D. Yeager and David F. Bahr, Crystals, vol. 7, pp. 335(1:9) (2017) DOI: [10.3390/cryst7110335](http://dx.doi.org/10.3390/cryst7110335)
51. *Precipitate strengthening and thermal stability in three component metallic nanolaminate thin films*R.L. Schoeppner, A.A. Taylor, M.J. Cordill, H.M. Zbib, J. Michler, and D.F. Bahr, Materials Science & Engineering A, vol. 712, pp. 485-492 (2018) DOI: 10.1016/j.msea.2017.11.062
52. *Synthesis, microstructure, and mechanical properties of polycrystalline Cu nano-foam*   
    C.E. Kim, R.M. Rahimi, N. Hightower, I. Mastorakos, D.F. Bahr MRS Advances, vol 3, pp. 4690475 (2018) DOI:10.1557/adv.2018.128
53. *Shock engineering the additive manufactured graphene-metal nanocomposite with high density nanotwins and dislocations for ultra-stable mechanical properties*Dong Lin, Maithilee Motlag, Mojib Saei, Shengyu Jin, Raheleh Mohammad Rahimi, David F. Bahr, and Gary J. Cheng, Acta Materialia, vol. 150, pp. 360-372 (2018) DOI: 10.1016/j.actamat.2018.03.013
54. *Probing the effect of hydrogen on elastic properties and plastic defomation in nickel using nanoindentation and ultrasonic methods*S.K. Lawrence, B.P. Somerday, M.D. Ingraham, D.F. Bahr, JOM, vol. 70, pp. 1068-1073 (2018) DOI: 10.1007/s11837-018-2850-z
55. *Electronic structure and surface properties of MgB2 (0001) upon oxygen absorption*Chang-Eun Kim, Keith G. Ray, David F. Bahr, Vincenzo Lordi, Physical Review B, vol. 97, pp 195416 (2018) DOI: 10.1103/PhysRevB.97.195416
56. *Probing Adhesion of Metallic Nanoparticles on Polymeric Fibrous and Flat Architectures*Temitope Q. Aminu and David F. Bahr, MRS Advances, vol. 3, pp. 2749-2756 (2018)
57. *The mechanical response of arrays of carbon nanotubes coated with metallic shells*Mohamad B. Zbib, Matthew Howard, Michael R. Maughan, Nicolas Briot, T. John Balk, and David F. Bahr, MRS Advances, vol. 3, pp. 2801-2808 (2018) DOI: 10.1557/adv.2018.562
58. *An energy-based nanoindentation method to assess localized residual stresses and mechanical properties on shot-peened materials*Siavash Ghanbari and David F. Bahr, Journal of Materials Research, vol. 34, pp. 1121-1129 (2019) DOI: 10.1557/jmr.2019.41
59. *Individual Phase Deformation and Flow Correlation to Macroscopic Constitutive Properties of DP1180 Steel*Raheleh M. Rahimi and David F. Bahr, Materials Science and Engineering A, vol. 756, pp. 328-335 (2019) <https://doi.org/10.1016/j.msea.2019.04.063>
60. *Application of oxidized metallic surfaces as a medium to store biochemical agents with antimicrobial properties*Hector M. Espejo and David F. Bahr, Surface and Coatings Technology, vol 372, pp. 312-318 (2019) DOI:10.1016/j.surfcoat.2019.05.059
61. *Residual stress asymmetry in thin sheets of double-sided shot peened aluminum*Siavash Ghanbari, Michael D. Sangid, and David F. Bahr, Journal of Materials Engineering and Performance, vol. 28, 3094-3104 (2019) DOI: 10.1007/s11665-019-04066-3
62. *Nisin infusion into surface cracks in oxide coatings to create an antibacterial metallic surface*Hector M. Espejo, Susana Diaz-Amaya, Lia A. Stanciu, and David F. Bahr, Materials Science and Enginering C, DOI: [10.1016/j.msec.2019.110034](https://doi.org/10.1016/j.msec.2019.110034" \t "_blank" \o "Persistent link using digital object identifier)
63. *Hardening Particulate Ti Media Through Controlled Oxidation*D.A. Brice, R.M. Rahimi, and D.F. Bahr, Metallurgical and Materials Transactions A, vol. 50, pp. 3980-3984 (2019) DOI: 10.1007/s11661-019-05326-6
64. *Indentation fracture behavior of energetic and inert molecular crystals*A.C. Burch, J.D. Yeager, and D.F. Bahr, Journal of Materials Research, vol. 34, pp. 3954-3963 (2019) DOI:10.1557/jmr.2019.345
65. *The structure and mechanical properties of Cu50Ni50 alloy nanofoams formed via polymeric templating*C.E. Kim, R.M. Rahimi, and D.F. Bahr, MRS Communications, vol. 10, pp. 286-291 (2020) DOI:10.1557/mrc.2020.16
66. *A Thermal and Nanomechanical Study of Molecular Crystals as Versatile Mocks for Pentaerythritol Tetranitrate*A.C. Burch, Z.R. Wilde, D.F. Bahr and J.D. Yeager, Crystals, vol. 10, paper 126 15 pages (2020) DOI:10.3390/cryst10020126
67. *Effect of ionizing radiation and chewing simulation on human enamel and zirconia*Beshr Hajhamid, Raheleh Mohammad Rahimi, David F. Bahr, and Grace M. SeSouza, J. Prosthodontic Research, in press Sept. 2020 DOI:10.2186/jpr.JPOR\_2019\_592
68. *Predictions of decreased surface roughness after shot peening using controlled media dimensions*  
    Siavash Ghanbari and David F. Bahr, J. Materials Science & Technology, vol. 58, pp. 120-129 (2020) DOI:10.1016/j.jmst.2020.03.075
69. *Well-adhered copper nanocubes on electrospun polymeric fibers*  
    Temitope Q. Aminu, Molly C. Brockway, Jack L. Skinner, and David F. Bahr, Nanomaterials, vol. 10, 1982 (2020) DOI: 10.3390/nano10101982

# Refereed Conference Proceedings

1. *Effects of Microstructure on the Adhesion of Metal Reinforced Diamond Films*   
   J.W. Hoehn, D.F. Bahr, J.C. Nelson, J. Heberlein, E. Pfender and W.W. Gerberich, in Proceedings of the Materials Research Society, vol. 383, Mechanical Behavior of Diamond and Other Forms of Carbon, pp. 385-390 (1995)

###### Adhesion Evaluation of CVD Diamond Films and Metal Reinforced Composite Diamond Films D.F. Bahr, J.C. Nelson, D. Zhuang, J. Heberlein, E. Pfender and W.W. Gerberich, in Proceedings of the Materials Research Society, vol. 383, Mechanical Behavior of Diamond and Other Forms of Carbon, pp. 209-215 (1995)

1. *The Effect of In Plane and Out of Plane Stresses on the Adhesion Testing of Diamond Films*D.F. Bahr and W.W. Gerberich, in Proceedings of the Materials Research Society, vol. 436, Thin Films Stresses and Mechanical Properties VI, pp. 85-90 (1997)
2. *Mechanical Behavior of a MEMS Acoustic Emission Sensor*   
   D.F. Bahr, J.S. Wright, L.F. Francis, N.R. Moody and W.W. Gerberich, in Proceedings of the Materials Research Society, vol. 444, Materials in Mechanical and Optical Microsystems, pp. 209-214 (1996)
3. *The Effects of Residual Stress on Modulus Measurements By Indentation*D.F. Bahr, D.A. Crowson, J.S. Robach, and W.W. Gerberich, in Proceedings of the Materials Research Society, vol. 505, Thin Films Stresses and Mechanical Properties VII, pp. 85-90 (1998)
4. *Yield Point Phenomena During Indentation*D.F. Bahr, C.M. Watkins, D.E. Kramer, and W.W. Gerberich, in Proceedings of the Materials Research Society, Fundamentals of Nanoindentation and Nanotribology, vol. 522, pp. 83-88 (1998)
5. *Nanoindentation Evaluation of Passive Film Stress and Growth Kinetics*N.I. Tymiak, J.C. Nelson, W.W. Gerberich and D.F. Bahr, in Proceedings of the Materials Research Society, Fundamentals of Nanoindentation and Nanotribology, vol. 522, pp. 251-256 (1998)
6. *Reliability And Properties Of PZT Thin Films For MEMS Applications* D.F. Bahr, J.C. Merlino, P. Banerjee, C.M. Yip, and A. Bandyopadhyay, in Proceedings Of The Materials Research Society, Materials Science of MEMS Devices, vol. 546, pp. 153-158 (1999)
7. *The Strength And Fracture Of Passive Oxide Films On Metals*M. Pang, D. E. Wilson, and D.F. Bahr, in Proceedings of the Materials Research Society, Thin Films Stresses and Mechanical Properties VIII, vol. 594, pp. 501-506 (2000)
8. *Mechanical Properties And Adhesion Of PZT Thin Films For MEMS*J.M. Jungk, B.T. Crozier, A. Bandyopadhyay, N.R. Moody, and D.F. Bahr, in Proceedings of the Materials Research Society, Thin Films Stresses and Mechanical Properties VIII, vol. 594, pp. 225-230 (2000)
9. *Friction Measurement In MEMS Using A New Test Structure*B.T. Crozier­, M.P. de Boer, J.M. Redmond, D.F. Bahr, and T.A. Michalske, in Proceedings of the Materials Research Society, Materials Science Of MEMS Devices II, vol. 605, pp. 129-130 (2000)
10. *Influence of Grain Boundary Structure on Liquid Metal Penetration Behavior*Liping Ren, D.F. Bahr, and R.G. Hoagland, in Proceedings of the Materials Research Society, Multiscale Phenomena in Materials, vol. 578, pp. 411-416 (2000)
11. *Phase Transformations in Sol-Gel PZT Thin Films*  
    D.P. Eakin, M.G. Norton, and D. F. Bahr, in Proceedings of the Materials Research Society, Materials for Novel Oxide Based Electronics, vol. 623, pp. 185-190 (2000)
12. *Estimation of mechanical properties of titanium boride based composites produced by reactive hot pressing*Cirakoglu, M.;Peng, Z.X.;Stephens, R.R.;Bahr, D.F.;Bhaduri, S.B., Ceramic Engineering and Science Proceedings, vol. 21, pp. 737-744 (2000)
13. *The Effects of Solution Chemistry on Passive Film Fracture and Stress Corrosion*  
    D.F. Bahr, M. Pang, D. Rodriguez-Marek, and C.H. Johnson, in Chemistry and Electrochemistry of Stress Corrosion Cracking: A Symposium Honoring the Contributions of R.W. Staehle, ed. R.H. Jones, TMS pp. 353-361 (2001)
14. *Defects and Failure Modes in PZT Films for a MEMS Microengine*D.F. Bahr, B.T. Crozier, C.D. Richards, and R.F. Richards, Proceedings of the Materials Research Society, Materials Science of MEMS Devices III, vol. 657, pp. EE4.4.1-.6 (2001)
15. *Film Fracture Phenomena During Indentation*D.F. Bahr, M. Pang, and D. Rodriguez-Marek, Proceedings of the Materials Research Society, Fundamentals of Nanoindentation and Nanotribology II, vol. 649, pp. Q4.2.1 – 4.2.6 (2001)
16. *Plastic Zone Development Around Nanoindentations*C.L. Woodcock, D.F. Bahr, and N.R. Moody, Proceedings of the Materials Research Society, Fundamentals of Nanoindentation and Nanotribology II, vol. 649, pp. Q7.14.1 – 7.14.6 (2001)
17. *Adhesive Failure of a Thin Epoxy Film on an Aluminumized Substrate*  
    N.R. Moody, D.F. Bahr, M.S. Kent, J.A. Emerson, and E.D. Reedy, Jr., Proceedings of the Materials Research Society, Fundamentals of Nanoindentation and Nanotribology II, vol. 649, pp. Q6.3.1 – 6.3.6 (2001)
18. *Relationships Between Film Chemistry, Structure, and Mechanical Properties in Titanium Oxides*M. Pang, D.E. Eakins, M.G. Norton, and D.F. Bahr, Proceedings of the Materials Research Society, Structure-Property Relationships of Oxide Surfaces and Interfaces, vol. 654, pp. AA3.41.1-.6 (2001)
19. *Design of a Micro Heat Engine*C. Xu, J. Hall, C. Richards, D. Bahr, and R. Richards, ASME IMECE MEMS Symposium, MEMS-Vol. 2, pp. 261-267, Orlando FL, 2000
20. *Relationships Between Microstructure and Reliability in PZT MEMS*B.W. Olson, L.M. Randall, C.D. Richards, R.F. Richards, and D.F. Bahr, in Proceedings of the Materials Research Society, Transport and Microstructural Phenomena in Oxide Electronics, vol. 666, pp. F6.1.1-.9 (2001)
21. *Texture Effects on Corrosion Behavior of Friction Stir Welded 7075 Aluminum*  
    David P. Field, Tracy W. Nelson, Yuri Hovanski, and David F. Bahr, in Friction Stir Welding and Processing, ed. K.V. Jata, M.W. Mahoney, R.S. Mishra, S.L. Semiatin, and D.P. Field, MRS, pp. 83-91 (2001)
22. *Characterization of a Piezoelectric Membrane for MEMS Power*K. Bruce, R. Richards, D. Bahr, and C. Richards, Proceedings of the ASME IMECE 2001-Vol. 2, MEMS Symposium, Paper No. MEMS-23803, New York (2001)
23. *The P3 Micro Power Generation System*  
    C.D. Richards, D.F. Bahr, C-G Xu, and R.F. Richards, Proceedings of the ASME IMECE 2001 – Vol. 1, Microscale Thermal Phenomena in Energy Systems, Paper No. HTD-24283, New York (2001)
24. *Electro-Mechanical Coupling And Power Generation In A PZT Micro-Engine*D.F. Bahr, K.R. Bruce, B.W. Olson, L.M. Eakins, C.D. Richards, and R.F. Richards, Proceedings of the Materials Research Society, Materials Science of Microelectromechanical Systems (MEMS) Devices IV, vol. 687, pp. 57-62 (2002)
25. *Thin Film Fracture During Nanoindentation Of Hard Film – Soft Substrate Systems*M. Pang, K.D. Weaver, and D.F. Bahr, Proceedings of the Materials Research, Thin Films Stresses and Mechanical Properties IX, vol. 695, pp. L7.2.1-6 (2002)
26. *The Effects of Copper on the Interfacial Failure of Gold Films*N. R. Moody, D. P. Adams, M. J. Cordill, N. Yang, and D. F. Bahr, Proceedings of the Materials Research Society, Thin Films Stresses and Mechanical Properties IX, vol. 695, pp. 323-328 (2002)
27. *Film Thickness Effects on Interfacial Fracture of Epoxy Bonds*N.R. Moody, D.F. Bahr, M.S. Kent, J.A. Emerson, E.D. Reedy, Jr., Proceedings of the Materials Research Society, Polymer Interfaces and Thin Films, vol. 710, pp. 141-146 (2002).
28. *Strain Hardening and Cross Slip Measurements From Nanoindentation Experiments*D.F. Bahr, K.A. Nibur, and M. Pang, in Plasticity, Damage, and Fracture at Macro, Micro, and Nano Scales, ed. Akhtar S. Kahn and Oscar Lopez-Pamies, NEAT PRESS, MD, pp. 60-62 (2002)
29. *Optimization of Thermal Processing and Chemistry in the Fabrication of a PZT Based MEMS Power Generator*B.W. Olson, J.L. Skinner, C.D. Richards, R.F. Richards, and D.F. Bahr, Proceedings of the Materials Research Society, Perovskite Materials, vol. 718, pp. D10.25.1-7 (2002)
30. *PZT And Electrode Enhancements Of MEMS Based Micro Heat Engine For Power Generation*A.L. Olson, L.M. Eakins, B.W. Olson, D.F. Bahr, C.D. Richards, R.F.Richards, Proceedings of the Materials Research Society, Materials for Energy Storage, Generation, and Transport, vol. 730, pp. 173-178 (2002)
31. *An Upper Division General Education Course on Materials for Non-Engineering Students*  
    M. Grant Norton and David F. Bahr, 2002 Proceedings of the American Society for Engineering Education Annual Conference and Exhibition, paper 2356 (2002).
32. *Adhesion of Thin Ductile Films Using the Stressed Overlayer Method*M.J. Cordill, N.R. Moody, and D. F. Bahr, in Surface Engineering: In Materials Science II, ed. S. Seal, N.B. Hahortre, J. Moore, S. Suryanarayana, and A. Agarwal, TMS, Warrendale PA, pp. 41-47 (2003)
33. *Localized Deformation Around Nanoindentations and the Effects of Hydrogen on Dislocation Cross Slip*K.A. Nibur and D.F. Bahr, in Materials Lifetime Science and Engineering, ed. P.K. Liaw, R.A. Buchanan, D.G. Harlow, D.L. Klarstrom, P.F. Tortorelli, and R.P. Wei, TMS, Warrendale PA, pp. 69-75 (2003)
34. *Fracture Behavior of Thin Film PZT on Silicon MEMS and Membranes*A.L. Olson, J.L. Skinner, D.F. Bahr, C.D. Richards, and R. F. Richards, in , Proceedings of the Materials Research Society, Surface Engineering 2002 Synthesis, Characterization and Applications, vol. 750, pp. 605-610 (2003).
35. *Influence of Structure and Chemistry on Piezoelectric Properties of PZT in a MEMS Power Generation Application*L.M.R. Eakins, D.E. Eakins, C.D. Richards, M.G. Norton, R.F. Richards, and D.F. Bahr, in , Proceedings of the Materials Research Society, Structure-Property Relationships of Oxide Surfaces and Interfaces II vol. 751, pp. 139-144 (2003).
36. *Residual Stress Control to Optimize PZT MEMS Performance*M.S. Kennedy, D.F. Bahr, C.D. Richards, and R.F. Richards, in Proceedings of the Materials Research Society, Nano- and Microelectromechanical Systems (NEMS and MEMS) and Molecular Machines, vol. 741, pp. 163-168 (2003).
37. *Grain Size Effects on the Adhesion of Thin Ductile Films*  
    M.J. Cordill, T. Muppidi, and D.F. Bahr, in Proceedings of the Materials Research Society, Mechanical Properties Derived From Nanostructuring, vol. 778, pp. 221-226 (2003).
38. *Indentation Techniques for the Study of Deformation Across Grain Boundaries*  
    K.A. Nibur and D.F. Bahr, in Proceedings of the Materials Research Society, Mechanical Properties Derived From Nanostructuring Materials, vol. 778, pp. 129-134 (2003).
39. *Dislocation Mechanisms Around Nanoindentation: Cross Slip and Slip Steps*D.F. Bahr and K.A. Nibur, in Dislocations, Plasticity, and Metal Forming, Proceedings of Plasticity 2003, ed. A.S. Kahn, R. Kazmi, and J. Zhou, NEAT Press, pp. 253-255 (2004).
40. *Characterization of the Thermodynamic Working Cycle in a MEMS-Based Micro Heat Engine*  
    S.A. Whalen, L.W. Weiss, C.D. Richards, D.F. Bahr and R.F. Richards, , Proceedings of ASME IMECE, Paper No. IMECE2003-41426. (2003).
41. *The Mechanical Behavior of a Micromachined PZT Membrane*   
    I. Demir, R.F.Richards, D.F. Bahr and C.D. Richards, , Proceedings of ASME IMECE, IMECE2003 - (2003)
42. *Fabrication and Characterization of a Liquid-Metal Micro-Droplet Array for Use as a Thermal Switch*   
    A.O. Christensen, J.P. Jacob, C.D. Richards, D.F. Bahr and R.F. Richards, Proceedings of HT2003, Paper No. HT2003-40317 (2003)
43. *Fabrication and Characterization of a Liquid-Metal Micro-Droplet Thermal Switch*   
    A.O. Christensen, J.P. Jacob, C.D. Richards, D.F. Bahr and R.F. Richards,*,* Proceedings of Transducers’03, Paper No. AM069 (2003)
44. *Operation and Testing of a Micro Heat Engine*   
    S. Whalen, R.Richards, D. Bahr and C. Richards, Proc. Nanotech 2003, vol. 1, pp. 404-407 (2003).
45. *Electron microscopy of compound oxide laser materials*D.E. Eakins, J.B. LeBret, M.G. Norton, D.F. Bahr, and J.Q. Dumm, Laser Crystals, Glasses, and Nonlinear Materials Growth and Characterization, Yehoshua Y. Kalisky, Editor, Proceedings of SPIE, vol. 4970, pp. 1-9 (2003)
46. *Probing Hydrogen – Deformation Interactions Using Nanoindentation*D.F. Bahr, K.A. Nibur, K.R. Morasch, and D.P. Field, Hydrogen Effects on Material Behavior and Corrosion Deformation Interactions, N.R. Moody, A.W. Thompson, G.W. Was, R. Ricker, and R.H. Jones, ed., TMS, Warrendale PA, pp. 165-172 (2004)
47. *Student Response to a General Education Course on Materials*M. Grant Norton and David F. Bahr, 2004 Proceedings of the American Society for Engineering Education Annual Conference and Exhibition, paper 3464 (2004).
48. *How to Run a Successful Research Experience for Undergraduates Site*David F. Bahr and M. Grant Norton, 2004 Proceedings of the American Society for Engineering Education Annual Conference and Exhibition, paper 1793 (2004).
49. *Optimization of Film Stresses in Composite Piezoelectric Membrane Microgenerators*M.S. Kennedy, M. Zosel, C.D. Richards, R.F. Richards, D.F. Bahr, and K.W. Hipps, Proceedings of the Materials Research Society, Thin Films: Stresses and Mechanical Properties X, vol. 795, pp. 503-508 (2004).
50. *Electromechanical Behavior in Micromachined Piezoelectric Membranes*M.C. Robinson, J.C. Raupp, I. Demir, C.D. Richards, R.F. Richards, and D.F. Bahr, Proceedings of the Materials Research Society, Micro- and Nanosystems, vol. 782, pp. 217-222 (2003).
51. *Fracture and Residual Stress in Piezoelectric Thin Films for MEMS*  
    D.F. Bahr, M.S. Kennedy, M.C. Robinson, K.E. Shafer, C.D. Richards, R.F. Richards, Advanced Materials for Energy Conversion II, TMS, Warrendale PA, pp. 393-400 (2004)
52. *Spatially Dependent Mechanical Properties of Rat Whiskers for Tactile Sensing*   
    E.K. Herzog, D.F. Bahr, C.D. Richards, R.F. Richards, and D.M. Rector in Fundamentals of Nanoindentation and Nanotribology III, edited by Kathryn J. Wahl, Norbert Huber, Adrian B. Mann, David F. Bahr, and Y.-T. Cheng, Proceedings of the Materials Research Society, vol.**841**, pp. R3.6/Y3.6 (2005).
53. *Mechanical Properties of Wear Tested LIGA Nickel*  
    N.R. Moody, J.M. Jungk, M.S. Kennedy, S.V. Prasad, D.F. Bahr, and W.W. Gerberich in Fundamentals of Nanoindentation and Nanotribology III, edited by Kathryn J. Wahl, Norbert Huber, Adrian B. Mann, David F. Bahr, and Y.-T. Cheng, Proceedings of the Materials Research Society. vol.**841**, pp. R7.8 (2005).
54. *Investigation of Indentation Methods for Properties Determination in Hard Film - Soft Substrate Systems*   
    M.S. Kennedy, N.R. Moody, and D.F. Bahr in Fundamentals of Nanoindentation and Nanotribology III, edited by Kathryn J. Wahl, Norbert Huber, Adrian B. Mann, David F. Bahr, and Y.-T. Cheng, Proceedings of the Materials Research Society. vol.**841**, pp. R12.7 (2005).
55. *Fabrication Methods For Improved Electromechanical Behavior In Piezoelectric Membranes*  
    M.C. Robinson, P.D. Hayenga, J.H. Cho, C.D. Richards, R.F. Richards, and D.F. Bahr, Proceedings of the Materials Research Society, vol.**872**,, pp. J18.26 (2005)
56. *Synthesis and Microanalysis of Aligned Carbon Nanotube Arrays*Devon McClain, Lifeng Dong, Chiaching Pan, Jun Jiao, Coralee McCarter, David Bahr, Cecilia Richards, Robert Richards, Microscopy and Microanalysis, vol. 11(Suppl 2), pp. 1920-1921( 2005)
57. *A Microscopy Study on the Origin of Asterism in Almandine-Pyrope Garnets*  
    Maxime J-F. Guinel, M. Grant Norton, and David F. Bahr, Microscopy and Microanalysis, vol. 11 (Suppl 2), pp. 1776-1777 (2005)
58. *Integration of Carbon Nanotubes with MEMS through Standard Photolithographic Techniques*  
    C.M. McCarter, D.F. Bahr, R.F. Richards, C.D. Richards, D. McClain, and J. Jiao, Proceedings of Materials Science and Technology 2005 Conference, Symposium on Nanomaterials, pp. 45-52 (2005).
59. *Characterization and Modeling of a Liquid-Vapor Phase-Change Membrane Actuator with an Integrated SU-8 Micro Capillary Wicking Structure*   
    S.A Whalen, S.Y. Won, R. F. Richards, D. F. Bahr, and C.D. Richards, , Transducers ’05, Paper No. AM837, Seoul, Korea, June 5-9, 2005
60. *Characterization of a Liquid-Vapor Phase Change Actuator*  
    S.A. Whalen, R.F. Richards, C.D. Richards, D.F. Bahr, ASME IMECE, Paper No. IMECE-82564, Orlando, FL, Nov. 5-11, (2005)
61. *Evaporative Heat Transfer from Ten-Micron Channels* T.A. Quy, D.A. Carpenter, C.D. Richards, D.F. Bahr and R.F. Richards, ASME IMECE, Paper No. IMECE-81460, Orlando, FL, Nov. 5-11,(2005)
62. *Characterization of an External Combustion Dynamic Micro Heat Engine* L.W. Weiss, K.E. McNeil, D.F. Bahr, C.D. Richards, and R.F. Richards, PowerMEMS 05, Technical Digest, pp.29-32, Tokyo, Nov. 29-30, (2005)
63. *TEM Characterization of thin passive films grown on austenitic stainless steels*R.S. Yassar, A. Alamr, M.G. Norton, D.F. Bahr, and D.P. Field, International Surface Engineering Congress 2005, Proceedings of the Fourth International Surface Engineering Congress, Ed. M.J. Jackson, ASM International, pp. 174-177 (2006).
64. *Effect of Diameter on Electron Field Emission of Carbon Nanotube Bundles*Devon McClain, Mason DeRoss, Noel Tavan, Jun Jiao, Coralee M. McCarter, Robert F. Richards, Sinisa Mesarovic, Cecilia D. Richards, David F. Bahr, Proceedings of the Materials Research Society, vol. 901E**,** pp. 0901-Ra16-52-Rb16-52.1 (2006)
65. *Generated power characterization of piezoelectrics with electromechanical coupling coefficient and quality factor*  
    J.H. Cho, R.F. Richards, D.F. Bahr, C.D. Richards, and M.J. Anderson, 2006 IEEE Ultrasonics Symposium, pp. 485-488 (2006).
66. *Mechanical-to-electrical Energy Conversion of Thin-film Piezoelectric Membrane Laminates for Micropower Generation* Dylan J Morris, Michelle C. Robinson, Leland W Weiss, Cecilia D Richards, Robert F Richards and David F Bahr, in Mobile Energy, edited by A. Nathan, G. Amaratunga, M. Nookala, L.G. Scanlon, E. Morinobu, Proceedings of the Materials Research Society, vol.. **973E**, pp. BB6.4.1-6.4.6 (2007)
67. *Failure in PZT thin films*D.F. Bahr, D.J. Morris, M.C. Robinson, A.L. Olson, C.D. Richards, R.F. Richards, in Experimental Analysis of Nano and Engineering Materials and Structures, Proceedings of the 13th International Conference on Experimental Mechanics, ed. E.E. Gdoutos, Springer, pp. 571-572 (2007)
68. *Design and Development of Metal – Polymer Film Systems for Flexible Electrodes used in Cortical Mapping*  
    J. Yeager, D.F. Bahr, D. Rector, C.D. Richards, R.F. Richards, ASM MPMD (Materials and Processes for Medical Devices) Conference Proceedings, (2007).
69. *Indentation response of nanosturctured turfs*  
    A.A. Zbib, D.F. Bahr, S. Dj. Mesarovic, E.T. Lilleodden, D. McClain, and J. Jiao, in Fundamentals of Nanoindentation and Nanotribology, eds. Eric Le Bourhis, Dylan J. Morris, Michelle L. Oyen, Ruth Schwaiger, Thorsten Staedler, Proceedings of the Materials Research Society, vol. 1049, pp AA02-08 (2008)
70. *Fabrication and hot switching behavior of electroplated Ga spheres for MEMS*  
    Yoonkap Kim and David F. Bahr, Proceedings of the Materials Research Society Fall 2008 Meeting, vol. 1139, pp GG03-05 (2009)
71. *Strength Enhancements of Nanoscale Multilayers for MEMS Electrodes in Oxidizing Environments*  
    A. Bellou, R.L. Schoeppner, D.F. Bahr, in *Nano- and Microscale Materials***—***Mechanical Properties and Behavior under Extreme Environments*, edited by A. Misra, T.J. Balk, H. Huang, M.J. Caturla, C. Eberl, Proceedings of the Materials Research Society, vol. 1137E, 1137-EE05-27 (2009)
72. *A Materials Outreach Program Developed by MSE Undergraduates for Junior-High Students Focused on Grade Level Expectations*D.F. Bahr, Proceedings of the 2009 ASEE Annual Conference, Materials Division, paper AC 2009-2437
73. *A One Week Intensive Short Course for Introducing Lower-Division Students to Undergraduate Research*  
    D.F. Bahr, Proceedings of the 2009 ASEE Annual Conference, Experimentation and Laboratory Oriented Studies, paper AC 2009-2436
74. *Multi-layer metallic composites as strong electrode structures for MEMS*D.F. Bahr, A. Bellou, N. Overman, H.M. Zbib, in Proceedings of the 12th International Conference on Fracture, Paper T24.003 (CD Proceedings) (2009)
75. *Spatial variations in the mechanical properties and electrical properties of carbon nanotube turfs*  
    David Bahr, Anqi Qiu, Melinda Lopez, Aikaterini Bellou, Devon McClain, Jun Jiao, in *Low-Dimensional Functional Nanostructures--Fabrication, Characterization and Applications*, edited by H. Riel, W. Lee, M. Zacharias, M. McAlpine, T. Mayer, H. Fan, M. Knez, S. Wong, Proceedings of the Materials Research Society, vol. 1258, 1258-R10-29 (2010)
76. *Fabrication and characterization of two compliant electrical contacts for MEMS: Gallium microdroplets and carbon nanotube turfs*  
    Y. Kim, A. Qiu, J.A. Reid, R.D. Johnson, and D.F. Bahr, in *Microelectromechanical Systems—Materials and Devices IV*, Proceedings of the Materials Research Society, vol. 1299, 1258-S10-03 (2011) DOI:10.1557/opl.2011.533
77. *Inception of plasticity in the presence of vacancies in FCC single crystals: indenter size effect*  
    I. Salehinia, V. Perez, M. Weber, and D.F. Bahr, in *Deformation Mechanisms, Microstructure Evolution and Mechanical Properties of Nanoscale Materials,* Proceedings of the Materials Research Society, vol. 1297, mrsf10-1297-p03-60 DOI:10.1557/opl.2011.654
78. *Nanomechanical properties of Teflon amorphous Fluoropolymer – MWCNT bilayer films*R.L. Schoeppner, A. Qiu, D.D. Stauffer, R.C. Major, J.L. Skinner, T. Zifer, G. O’Bryan, A. Vance, W.W. Gerberich, D.F. Bahr, and N.R. Moody, in Properties and Processes at the Nanoscale – Nanomechanics of Material Behavior, Materials Research Society Symposium Proceedings, vol. 1424, pp. 55-60 (2012) DOI:10.1557/opl.2012.534
79. *Deformation and fracture of oxides fabricated on 304L stainless steel via pulsed laser irradiation*S.K. Lawrence, D.D. Staufer, R.C. Major, D.P. Adams, W.W. Gerberich, D.F. Bahr, and N.R. Moody, in Properties and Processes at the Nanoscale – Nanomechanics of Material Behavior, Materials Research Society Symposium Proceedings, vol. 1424, pp. 73-78 (2012) DOI: 10.1557/opl2012.819
80. *Three Training Programs for Preparing Undergraduates to Conduct Research*   
    S.K. Burkett, D.F. Bahr, S.N. Pressley, K.R. Schneider, J.C. Lusth, Proceedings of the American Society for Engineering Education 2013 Annual Meeting, paper 6352 (2013).
81. *Effects of solute hydrogen on the toughness of polycrystalline silicon*  
    M.B. Zbib and D.F. Bahr, 2012 Inernational Hydrogen Conference, Hydrogen Materials Interactions, ed. B.P. Somerday and P. Sofronis, ASME Press, pp. 787-793 (2014)
82. *Tools for launching undergraduates into research: Pre-research coursework in sciences*K.R. Schneider, K. Fedorka, D. Bahr, S. Burkett, J. Lusth, S. Pressley, N. Vanbennekom, Annual Meeting of the Society for Integrative and Comparative Biology, Integrative and Comparative Biology, vol. 55, pp. E325-325 (2015)

**Other Technical Reports**

1. Development of Experimental Verification Techniques for Non-Linear Deformation and Fracture  
D. F. Bahr and N. R. Moody, Sandia National Laboratories, Albuquerque, NM 87185 and Livermore, CA 94550, LDRD PECASE Final Report, December 2003 (SAND2003-8659)

2. Reliability of Materials in MEMS: Residual Stress and Adhesion in a Micro Power Generation System  
M.S. Kennedy, D.F. Bahr, and N.R. Moody, Sandia National Laboratories, Albuquerque, NM 87185 and Livermore, CA 94550, September 2007 (SAND2007-6070)

**Presentations (64 invited or keynote)**

1. *Effects of Molybdenum on Pitting Corrosion in Austenitic Stainless Steels*D.F. Bahr and W.M. Mullins, NACE Corrosion 93 Conference, New Orleans, LA (1993)
2. *Adhesion Evaluation of CVD Diamond Films and Metal Reinforced Composite Diamond Films*D.F. Bahr, J.C. Nelson, D. Zhuang, J. Heberlein, E. Pfender and W.W. Gerberich, Materials Research Society, Spring Meeting, Symposium I, Mechanical Behavior of Diamond and Other Forms of Carbon (1995)
3. *The Effect of In Plane and Out of Plane Stresses on the Adhesion Testing of Diamond Films*   
   D.F. Bahr and W.W. Gerberich, Materials Research Society Spring Meeting, Symposium CC, Thin Films Stresses and Mechanical Properties VI (1996)
4. *Acoustic Emission as Identification of Physical Phenomena*   
   D.F. Bahr, D. E. Kramer, J. S. Wright, L.F. Francis and W.W. Gerberich, Materials Research Society Spring Meeting, Symposium AA, Advances in Instrumentation (1996)
5. *Mechanical Behavior of Passivating Surfaces Under Potentiostatic Control*   
   D.F. Bahr, J.C. Nelson and W.W. Gerberich, Poster at Gordon Conference on Aqueous Corrosion (1996)
6. *Indentation and Acoustic Emission in Nitride Films*   
   D.F. Bahr, J.W. Hoehn, N.R. Moody and W.W. Gerberich, ASM /TMS Materials Week, Characterization of Ultrahard Coatings (1996)
7. *Mechanical Behavior of a MEMS Acoustic Emission Sensor*   
   D.F. Bahr, J.S. Wright, L.F. Francis, N.R. Moody and W.W. Gerberich, Materials Research Society Fall Meeting, Symposium I, Materials in Mechanical and Optical Microsystems (1996)
8. *The Mechanical Behavior of PZT Thin Films Deposited by A Sol-Gel Technique*D.F. Bahr, J.S. Wright, L.F. Francis, N.R. Moody and W.W. Gerberich, TMS Annual Meeting, Evolution and Advanced Characterization of Thin Film Microstructures (1997)
9. *The Role of Passive Films on the Mechanical Properties of Metals*D.F. Bahr, **Invited** : Ohio State University Materials Engineering Seminar , April 9, 1997
10. *The Effects of Hydrogen on the Mechanical Behavior of a Beta Titanium Alloy and NiAl*D.F. Bahr and W.W. Gerberich, Poster at Gordon Conference on Hydrogen in Metal Systems (1997)

#### The Effects of Residual Stress on Modulus Measurements By Indentation D.F. Bahr, D.A. Crowson, J.S. Robach, and W.W. Gerberich, Materials Research Society Fall Meeting, Symposium NN, Thin Films Stresses and Mechanical Properties VII (1997).

1. *Yield Point Phenomena During Indentation*D.F. Bahr, C.M. Watkins, D.E. Kramer, and W.W. Gerberich, Materials Research Society Spring Meeting, Symposium T, Fundamentals of Nanoindentation and Nanotribology (1998)
2. *Reliability And Properties Of PZT Thin Films For MEMS Applications*D.F. Bahr, J.C. Merlino, P. Banerjee, C.M. Yip, And A. Bandyopadhyay, Materials Research Society Fall Meeting Symposium AA, Materials Science Of MEMS Devices (1998)
3. *Materials Research Opportunities at Washington State University*  
   D.F. Bahr, Invited: Whitworth College, Chemistry and Physics Seminar, March 30, 1999
4. *The Mechanical Behavior of Thin Film – Substrate Systems*  
   D.F. Bahr, Invited: University of Idaho, ASM/TMS general meeting, April 20, 1999
5. *Local Passive Film Fracture And Repassivation Testing*D.E. Wilson, M. Pang, and D.F. Bahr, NACE Corrosion 1999 Research in Progress Symposium (1999)
6. *Mechanical Deformation In Thin Film – Substrate Systems*D.F. Bahr, **Invited**, Washington State University, Department Of Chemistry Seminar, Sept. 17, 1999
7. *The Strength And Fracture Of Passive Oxide Films On Metals*M. Pang, D. E. Wilson, and D.F. Bahr, Materials Research Society Fall Meeting Symposium, Thin Films Stresses and Mechanical Properties VIII (1999)

# *Influence of Grain Boundary Structure on Liquid Metal Penetration Behavior* Liping Ren, D.F. Bahr, and R.G. Hoagland, Materials Research Society Fall Meeting Symposium A, Multiscale Phenomena in Materials (1999)

26. *Mechanical Deformation in Small Volumes : MEMS and Thin Films*  
D.F. Bahr, **Invited**, Boise State University Engineering Seminar, Feb. 11, 2000

1. *Course Development For Increasing The Awareness Of Materials Science To Non-Engineering Majors*  
   D.F. Bahr and M.G. Norton, Materials Research Society Spring Meeting, Symposium HH, Materials Science and Engineering Education in the New Millennium (2000)
2. *Mechanical Properties and Testing Methods for Thin Films: Fracture and Adhesion Studies*  
   D.F. Bahr, **Invited**, University of Toronto, Center for Molecular Imaging, October 19, 2000
3. *Fatigue and Fracture in Membranes for MEMS Power Generation*D.F. Bahr, B.T. Crozier, C.D. Richards, and R.F. Richards, ASTM Committee E8 on Fatigue and Fracture, Symposium on Mechanical Properties of Structural Films, (2000)
4. *Defects and Failure Modes in PZT Films for a MEMS Microengine*D.F. Bahr, B.T. Crozier, C.D. Richards, and R.F. Richards, Materials Research Society Fall Meeting, Symposium EE, Materials Science of MEMS Devices III (2000)
5. *Film Fracture Controlled Excursions in Oxide-Metal Systems*D.F. Bahr, M. Pang, and D. Rodriguez-Marek, Materials Research Society Fall Meeting, Symposium Q, Fundamentals of Nanoindentation and Nanotribology II (2000)
6. *The Effects of Solution Chemistry on Passive Film Fracture and Stress Corrosion*  
   D.F. Bahr, M. Pang, D. Rodriguez-Marek, and C.H. Johnson, TMS 2001 Annual Meeting, Chemistry and Electrochemistry of Stress Corrosion Cracking: A Symposium Honoring the Contributions of R.W. Staehle, (2001)
7. *Indentation Techniques to Measure the Adhesion of Hard Films on Soft Substrates*  
   D.F. Bahr and A.L. Olson, TMS 2001 Annual Meeting, General Abstracts Adhesion Symposium (2001)
8. *Passive Film Fracture: Correlation Between Bulk and Nanoscale Testing*  
   D.F. Bahr, M. Pang, D. Rodriguez-Marek, and C.H. Johnson, Corrosion 2001, Research in Progress Symposium (2001)
9. *Implementation of an Upper Division General Education Course on Materials*  
   D.F. Bahr and M.G. Norton, Materials Research Society Spring Meeting, Symposium GG, Impacting Society through Materials Science and Engineering Education (2001)
10. *Slip Band and Step Formation Around Small Scale Indentations*  
    D.F. Bahr, C.L. Woodcock, and K.R. Morasch, Materials Research Society Spring Meeting, Symposium BB, Material Instabilities and Patterning in Metals (2001)
11. *Design and Reliability of the P3 Microengine*D.F. Bahr, **Invited**, Xerox Palo Alto Research Center, Technical Seminar, August 9, (2001)
12. *Passive Film Fracture in Corrosive Environments*D.F. Bahr, **Invited**, Pacific Northwest National Laboratories, Stress Corrosion Cracking Technical Seminar, September 7, (2001)
13. *Thin Film Fracture During Nanoindentation Of Hard Film – Soft Substrate Systems*D.F. Bahr, K.D.Weaver, and D.F. Bahr, Materials Research Society Fall Meeting, Symposium L, Thin Films Stresses and Mechanical Properties IX (2001)
14. *Electro-Mechanical Coupling And Power Generation In A PZT Micro-Engine*D.F. Bahr, K.R. Bruce, B.W. Olson, L.M. Eakins, C.D. Richards, and R.F. Richards, Materials Research Society Fall Meeting, Symposium B, Materials Science of Microelectromechanical Systems (MEMS) Devices IV (2001)
15. *Strain Hardening and Cross Slip Measurements From Nanoindentation Experiments*D.F. Bahr, K.A. Nibur, and M. Pang, Plasticity 2002, January 4 (2002)
16. *Probing Hydrogen – Deformation Interactions Using Nanoindentation*D.F. Bahr, K.A. Nibur, K.A. Morasch, and D.P. Field, International Conference on Hydrogen Effects on Material Behavior and Corrosion Deformation Interactions, September 23 (2002).
17. *Introducing Upper Division Non-Engineering Students to Materials*  
    D.F. Bahr and M.G. Norton, Materials Research Society Fall Meeting, Symposium JJ, The Undergraduate Curriculum in Materials Science and Engineering (2002)
18. *Materials in the P3 Microengine*D.F. Bahr Invited, Sandia National Laboratories, Materials Reliability Technical Seminar, January 11 (2003)
19. *Materials Reliability and Packaging in a Piezoelectric MEMS Microengine*D.F. Bahr, A.L. Olson, L.M.R. Eakins, M.S. Kennedy, J.M. Kayner, C.D. Richards, and R.F. Richards, TMS Annual Meeting, Advances in MEMS and Optical Packaging, March 3, (2003).
20. *The P3 Micro Power System*D.F. Bahr, Invited, Bechtel Bettis Atomic Power Laboratory, Technical Seminar, June 2 (2003)
21. *Residual Stress and Fracture in a PZT Based MEMS Microengine*D.F. Bahr, M.S. Kennedy, M.R. Robinson, R.F. Richards, and C.D. Richards, ASME 2003 Mechanics and Materials Conference, July (2003).
22. *Fracture in Thin Oxide Films*  
    D.F. Bahr, Invited, Materials Research Society Fall Meeting, Symposium U, Thin Films Stresses and Mechanical Properties X, December 2 (2003)
23. *Adhesion of Hard Coatings on Electroplated Metals for Microelectronic Based Systems*  
    D.F. Bahr, M.J. Cordill, and N.R. Moody, TMS Annual Meeting, 5th Global Innovations Symposium: Trends in LIGA, Miniaturization, and Nano-scale Materials: Small Volume Deformation, March (2004)
24. *Incorporating Diverse Majors and Backgrounds in Materials Science Research Experience for Undergraduates*D.F. Bahr and M.G. Norton, Materials Research Society Spring Meeting, Symposium BB, Educating Tomorrow’s Materials Scientists and Engineers, April (2004).
25. *MEMS Power Systems for Energy Harvesting*  
    D.F. Bahr, Invited, PNNL Internal Seminar, October (2004)
26. *Piezoelectric Materials In MEMS*  
    D.F. Bahr, Invited, Portland State University, Mechanical Engineering and Materials Science Seminar, Feb. 4 (2005)
27. *Through thickness fracture behavior in hard films on soft substrates*

D.F. Bahr **Invited**, K.R. Morasch, M.S. Kennedy, S.P. Anderson, A Alamr, and N.R. Moody, TMS Annual Meeting, Mechanical Properties of Thin Films and MEMS Symposium, February (2005)

54. *Piezoelectric MEMS Power Generation*  
D.F. Bahr, **Invited**, Forschungszentrum Karlsruhe, Institute for Materials Research, March 15, (2005)

55. *Thin Film Fracture and Dislocation Nucleation*  
D.F. Bahr, **Invited**, ETH Zurich, Department of Materials Science Seminar, March 17, (2005)

56. *Fracture of Piezoelectric MEMS Structures*  
D.F. Bahr, A.L. Olson, M.S. Kennedy, K.R. Morasch, C.D. Richards, R.F. Richards, 11th International Conference on Fracture, Turin, Italy, March 23 (2005).

57. *Piezoelectric MEMS for Small Scale Localized Power Generation*D.F. Bahr, **Invited**, Los Alamos National Laboratory, DX2 Group Seminar, Los Alamos, NM, July (2005)

58. *Adhesion and through thickness fracture of ceramic – metal systems in MEMS*  
D.F. Bahr, **Invited**, Army Research Office Workshop on Dynamic Fracture in MEMS, Arlington, VA, August (2005).

1. *Development and Results from an Undergraduate Materials Course Targeted at Non-Engineering Students*David F. Bahr; M. Grant Norton What Makes a Good Materials Engineer and How Best to Educate Them Symposium, Materials Science and Technology 05, September (2005)
2. *The Effectiveness of Active Undergraduate Research in Materials Science and Engineering*  
   D.F. Bahr, **Invited**, Materials Research Society Fall Meeting, Symposium PP, Forum on Materials Science Education, November (2005).
3. *Initiation and Slip Propagation During Indentation in FCC Alloys*D.F. Bahr, K.A. Nibur, G. Vasquez, A. Zbib, R. Akasheh, and H. Zbib, Materials Research Society Fall Meeting, Symposium AA, Micro- and Nanomechanics of Structural Materials, November (2005).
4. *The P3 Micropower System: Commercialization Future*  
   D.F. Bahr, **Invited**, NorthWest Entrepreneurs Network Adventures in SmallTech: Nano and MEMS, Bellevue, WA, January (2006)
5. *The Effects of Solute Impurities on the Onset of Plasticity in FCC Materials*  
   Gus Vasquez and David F. Bahr, TMS 2006 Annual Meeting, Deformation and Fracture from Nano to Macro: A Symposium Honoring W.W. Gerberich’s 70th Birthday, March (2006)
6. *Indentation Induced Through Thickness Film Fracture on Engineering Alloys*  
   D.F. Bahr, K.R. Morasch, A. Alamr, European Conference of Fracture 16, Deformation and Fracture at the Nano Scale, Alexendroupolis, Greece, July (2006)
7. *Dislocation Nucleation and Propagation Anisotropy in FCC and BCC metals*  
   D.F. Bahr, K.A. Nibur, G. Vasquez, and A. Zbib, Plasticity 2006, Halifax, Nova Scotia, Canada, July (2006)
8. *A complete MEMS-based power solution for wireless Microsystems*  
   David Bahr, **Invited**, Dylan Morris, Cill Richards, Robert Richards, Charles Lakeman, Micro Nano Breakthrough Conference, Vancouver WA, July (2006)
9. *Thin Film Adhesion Testing of Novel Materials for MEMS*  
   D.F. Bahr, M.S. Kennedy, Applied Mechanics Presentation, International Mechanical Engineering Conference and Expo, Chicago IL, November (2006)
10. *Impact of Buckling and Adhesion on the Mechanical Response of Vertically Aligned Carbon Nanotube Structures*.   
    David F. Bahr, C. M. McNee, A. Zbib, C. D. Richards, S. Mesarovic,R. F. Richards, D. McClain, J. Jiao, K. Sinnathamby, H. Ma and C. M. Yip, MRS Fall Meeting, Symposium Q: Nanowires and Carbon Nanotubes -- Science and Applications, December (2006).
11. *Synthesis, Characterization, and Mechanical Properties of Metal Organic Frameworks*Blake Simmons, David Bahr, Julia Reid, Mark Allendorf, William Mook, Christina Bauer and Neville Moody, MRS Fall Meeting, Symposium E: Nanofunctional Materials, Nanostructures, and Novel Devices for Biological and Chemical Detection, December (2006)
12. *Nanomechancial Behavior of Engineering Materials*David Bahr, **Invited**, Structural Materials Division Symposium: Mechanical Behavior of Nanostructured Materials in honor of Carl Koch, 2007 TMS Annual Meeting, February (2007).
13. *Mechanical Behavior of MEMS: Small Structures and Large Strains*  
    David Bahr, **Invited**, University of Kentucky Department of Chemical Engineering and Materials Science Engineering, Departmental Seminar, Lexington , KY, March (2007)
14. *Undergraduate Research Opportunities: Developing Programs for Incorporating Undergraduates into Active Research Teams*David Bahr, **Invited**, WSU Diabetes Initiative Spring Forum, WSU Spokane Riverpoint, March (2007)
15. *Energy Conversion in Piezoelectric Structures*  
    David Bahr, **Invited**, ICAM Workshop on Energy Conversion, Sponsored by Los Alamos and UC Davis, Santa Fe, NM, March (2007)
16. *Failure in PZT thin films*D.F. Bahr, D.J. Morris, M.C. Robinson, A.L. Olson, C.D. Richards, R.F. Richards, 13th International Conference on Experimental Mechanics, Alexandroupolis, Greece (2007)
17. *Mechanical Reliability in Novel MEMS Materials for Microscale Power Generation*David F. Bahr, Marian S. Kennedy, Ali Zbib, Michelle C. Robinson, Sinisa Dj. Mesarovic, Cecilia D. Richards, Robert F. Richards, NIST Workshop on Materials Characterization for Nanoscale Reliability, Boulder, CO, August (2007)
18. *Adhesion of Nobel Metals for Electrodes in MEMS*  
    D.F. Bahr, M.S. Kennedy, and J.D. Yeager, MicroNano Reliability Conference, Berlin, Germany, September (2007)
19. *Adhesion and Fracture in non-Si based MEMS*   
    D.F. Bahr, **Invited**, M.S. Kennedy, and J.D. Yeager, Mechanics of Nanomaterials and Micro/Nano Devices, MS&T 07, Detroit, MI, September (2007)
20. *Design and Development of Metal-Polymer Film Systems for Flexible Electrodes used in Cortical Mapping*  
    J.D. Yeager, D.F. Bahr, and D.M. Rector, Frontiers of Materials Science: Materials for Sports and Medicine, MS&T 07, Detroit, MI, September (2007)
21. *Mechanical Reliability in MEMS Materials*  
     D.F. Bahr*,* **Invited**, Hewlett Packard Technical Seminar, Corvallis, OR, September 25 (2007)
22. *An Intensive “Camp” Format to Provide Undergraduate Research Experiences to First Year Students*  
    D.F. Bahr, K.O. Findley, Materials Research Society Fall Meeting, Symposium W: Forum on Materials Science and Engineering Education for 2020, Boston, Nov. (2007)
23. *Electromechancial Performance of Curved and Pressurized Piezoelectric Membranes*  
    D.J. Morris, D.F. Bahr, and M.J. Anderson, Materials Research Society Fall Meeting, Symposium DD: Microelectromechanical Systems – Materials and Devices, Boston, Nov. (2007)
24. *Interfacial fracture and failure in polymer – metal systems*  
    D.F. Bahr*,* J.D. Yeager, J.A. Youngsman, D.M. Rector, M.S. Kennedy, and N.R. Moody, Eighth International Conference on Fundamentals of Fracture (ICFF VIII), Hong Kong, January 4 (2008)
25. *Evaluation of the Elastic Properties of Human Corneas*R. Rivera, David Bahr, Julia Reid, Julie Last, Christopher Murphy, in Mechanical Behavior of Biological Materials, TMS 2008 Annual Meeting, March (2008)
26. *Deformation in Small Scale Structures for MEMS*  
    D.F. Bahr, **Invited**, University of Virginia, Mechanical Engineering Department Seminar, Charlottesville VA, March 27 (2008)
27. *Deformation in Thin Films and MEMS for Micropower Applications* David F. Bahr, **Invited**, M. R. Robinson, R. D. Johnson, J. H. Cho, D. J. Morris, R. F. Richards and C. D. Richards, Symposium LL, Energy harvesting – from fundamentals to devices, Materials Research Society Spring Meeting, April (2008)
28. *High strain behavior in materials for MEMS: Fracture, Delamination, and Buckling*  
    David F. Bahr, **Invited**, University of Leoben, Erich Schmid Institut fur Materialwissenschaft, June 13, (2008)
29. *Deformation of Nanotube Arrays for MEMS: Stiffness, Strength, and Adhesion*  
    David F. Bahr, **Invited**, Gordon Research Conference, Thin Film and Small Scale Mechanical Behavior, July (2008)
30. *Mechanical Deformation of Arrays of Carbon Nanotubes for Contact Switches*D.F. Bahr, R.D. Johnson, S. Mesarovic, J. Jiao,Micro and NanoMechanical Behavior of Low Dimensional Structures and Materials, Materials Science and Technology 2008 Conference, Pittsburgh, Oct. (2008).
31. *Deformation and Fatigue of Nanoscale Multilayer Metallic Composites*   
    David F. Bahr, **Invited**, Nicole Overman, Cory Overman, Ioannis Mastorakos, Firas Akasheh and Hussein M Zbib, Symposium EE: Nano- and Microscale Materials--Mechanical Properties and Behavior under Extreme Environments Materials Research Society Fall Meeting, December (2008)
32. *Deformation in Nanolayered Metallic Composites: Indentation and Bulge Testing Experiments*  
    David F. Bahr, **Invited**, Aikaterini Bellou, Nicole Overman, and Hussein Zbib, Plasticity and Fracture of Nanomaterials III, International Symposium on Plasticity, St. Thomas, US Virgin Islands, January (2009)
33. *Deformation in Small Scale MEMS Structures*  
    David F. Bahr, **Invited**, Univeristy of British Columbia, Department of Materials Science and Engineerng, Vancouver, BC, January (2009).
34. *Deformation of Nanotube Arrays for Contact Switches in MEMS*D.F. Bahr **Invited**, and R.D. Johnson, Mechanical Behavior of Nanostructured Materials: Strengthening Mechanisms at Small Length Scale, TMS Annual Meeting, February (2009)
35. *Carbon Nanotubes for High Strain Interconnects*  
    D. F. Bahr*,* RD. Johnson, R.J. Stromberg, and J. Jiao, Symposium PP: Materials and Devices for Flexible and Stretchable Electronics, Materials Research Society Spring Meeting, April (2009).
36. *Fracture and Failure in Polymer-Metal Systems for Flexible Electronics*  
    D.F. Bahr, **Invited**, J.D. Yeager, M.S. Kennedy, and N.R. Moody, 36th International Conference on Metallurgical Coatings and Thin Films, American Vacuum Society, San Diego, April 27 (2009)
37. *When Smaller is Better: Micromachines and Nanomaterials*  
     D.F. Bahr, **Invited**, ASM International Northwest Regional Leadership Meeting, Spokane June 13 (2009)
38. *Mechanical deformation in thin films and MEMS: Large strains, small structures, and adhesive contacts* D.F. Bahr, **Invited**, Texas A&M University Mechanical Engineering Department, Sept. 24 (2009)
39. *The impact of point and line defect density on the onset of plasticity during nanoindentation*  
    D.F. Bahr, Nanomechanical Testing in Materials Research and Development, ECI Conferences, Barga, Italy, Oct. 11-16 (2009)
40. *Probing deformation at grain boundaries using indentation techniques*  
    D.F. Bahr, **Invited**, Kevin Nibur, Stefhanni Jennerjohn, and Marc Weber, Structural Transitions and Local Deformation Processes at and Near Grain Boundaries, Materials Science and Technology 2009, Pittsburgh PA, Oct. 25-28 (2009)
41. *A one week intensive short course for introducing lower division students to undergraduate research in materials*D.F. Bahr, in Materials Education Symposium, Materials Research Society Fall Meeting, Dec. 3, (2009)
42. *Effects of point defects on near-theoretical strengths in metals observed during nanoindentation testing*  
    D.F. Bahr, S.L. Jennerjohn, M. Weber, in Plasticity in Confined Volumes-Modeling and Experiments Symposium, Materials Research Society Fall Meeting, Dec. 2, (2009)
43. *A one-week intensive short course to introduce lower division students to undergraduate research in materials and engineering*  
    D.F. Bahr, Council on Undergraduate Research, National Meeting, Workshop on Undergraduate Research, June 28 (2010)
44. *Strain hardening behavior in bi- and tri- layer metallic nanocomposites*D.F. Bahr, A. Bellou, H.M. Zbib, C. Overman, I. Mastorakos, in Advanced Metallic Materials, Materials Science and Technology 2010, Houston, TX Oct. 18 (2010)
45. *Multilayer metallic nanolaminates: strengthening in tri-layer systems*  
    A. Bellou, D.F. Bahr, I. Mastorakos, H.M. Zbib, A. Misra, ASME International Mechanical Engineering Congress, Vancouver BC, Nov. 17 (2010)
46. *Carbon nanotube turfs: deformation mechanics for boding to dissimilar substrates*  
    A. Qiu, A. Bellou, D.F. Bahr, S. Mesarovic, D.P. Field, and D. Kiener, ASME International Mechanical Engineering Congress, Vancouver BC, Nov. 17 (2010)
47. *Assessment of the applicability of Hertzian mechanics for determination of yield by nanoindentation*  
    D.J. Morris, L. Ma, L. Levine, S. Jennerjohn, and D.F. Bahr, ASME International Mechanical Engineering Congress, Vancouver BC, Nov. 18 (2010)
48. *Deformation in trilayer nanometallic multilayers with increased interface area for point defect sinks*  
    D.F. Bahr, I. Mastorakos, A. Bellou, A. Misra, H.M. Zbib, in Nanostructured Materials in Harsh Environments, Materials Research Society Fall Meeting, Nov. 29 (2010)
49. *An outreach program developed by MSE undergraduates for junior high students focused on grade level expectations*  
    D.F. Bahr, in Materials Education Development and Outreach, from K-Grad, Materials Research Society Fall Meeting, Nov. 30 (2010)
50. *Interactions between point defects and dislocation nucleation*  
    D.F. Bahr, V. Perez, E. Njeim, I. Salehinia, and M. Weber, in Mechanistic approaches across length scales, International Symposium on Plasticty, Puerto Vallarta, Mexico, Jan 4 (2011)
51. *The effect of point defects on the nucleation of plasticity in small volumes*  
    D.F. Bahr, Veronica Perez, Iman Salehinia, Marc Weber, TMS Annual Meeting, San Diego, CA Feb. 28-March 3 (2011)
52. *Probing strain hardening behavior in multilayer nanolaminate systems*  
    D.F. Bahr, **Invited**, Nanomechanical Testing in Materials Research and Development, Engineering Conferences International, Lanzarote, Spain, Oct. 13, (2011)
53. *Indentation methods to measure dislocation nucleation*  
    D.F. Bahr, I. Salehinia, V. Perez, M. Weber, Materials Science and Technology 2011, Columbus OH, Oct. 18 (2011)
54. *Multilayer metallic thin film composites for high strength and radiation resistance*  
    D.F. Bahr, **Invited**, Composites at Lake Louise, Structural Composites session, Lake Louise, Alberta Canada, Nov. 4 (2011)
55. *Dislocation nucleation in the presence of vacancies, stacking faults, and self interstitials*  
    D.F. Bahr, I. Salehinia, V. Perez, Y.K. Kim, Plasticity 2012, San Juan, Puerto Rico, Jan. 5 (2012)
56. *Size and dislocation gradients in indentation testing of bulk and layered materials*  
    D.F. Bahr, R.L. Schoeppner, S.K. Lawrence, H.M. Zbib, Plasticity 2012, San Juan, Puerto Rico, Jan. 4 (2012)
57. *Strain hardening behavior in multilayer thin films*  
    D.F. Bahr, R.L. Schoeppner, S. Lawrence, I. Mastorakos, H.M. Zbib, International Conference on Metallurgical Coatings and Thin Films, American Vacuum Society, San Diego, April 26, 2012
58. *If smaller is stronger, is nothing weaker?*  
    D.F. Bahr, **Invited**, Materials Science and Engineering Department Seminar, Harvard University, May 17 (2012)
59. *If smaller is stronger, is nothing weaker?*  
    D.F. Bahr, **Invited**, Materials Science and Engineering Department Seminar, Colorado School of Mines, March 28 (2013)
60. *If smaller is stronger, is nothing weaker?*D.F. Bahr, **Invited**, Materials Science and Engineering Department Seminar, Univeristy of Illinois, Sept. 9, (2013)
61. *Additional strengthening mechanisms in multicomponent metallic nanolayers*David Bahr, **Keynote speaker**, Nanoscale Multilayers 2012 meeting, Madrid, Spain, Oct. 4 (2013)
62. *Using small scale testing to extract the impact of structural defects on plasticity mechanisms*  
    David Bahr, Nanomechanical Testing in Materials Research and Development IV, and ECI meeting, Olhao, Portugul. Oct. 7 (2013)
63. *Pseudoelastic and superplastic behavior in open cell, multilayer metallic-carbon nanotube turf composites*David Bahr, **Invited**, Composites at Lake Louise, Lake Louise, Alberta Canada, Nov. 4 (2013)
64. *The onset of plasticity in FCC metals with point defects and associated stochasticity in hardness measurements*D.F. Bahr, M.R. Maughan, I. Salehinia, Symposium KK: Dislocation Plasticity, MRS Fall Meeting, Dec. 4 (2013)
65. *If smaller is stronger is nothing weaker? And is there a signal in the noise?*David Bahr, **Invited**, Materials Science and Engineering Department Seminar, Renseleer Polytechnic University, March 5, 2014.
66. *Tools for launching undergraduate students into research:* *a partnership at three universities*  
    David Bahr, Shelley Pressley, Susan Burkett, Kimberly Schneider, John Lutsh, Neyda Vanbennekom, Council on Undergraduate Research Conference 2014, Washington DC, June 30 (2014).
67. *Interfaces, inclusions, and impurities in nanolaminate metallic structrues*David Bahr, 51rst Annual Society of Engineering Science Meeting, Microscale and microstructural effects on mechanical behavior symposium, October 1 (2014)
68. *Coupling experiments and a stochastic crystal plasticity framework for strength assessment in small volumes of polycrystalline materials*D.F. Bahr, M.R. Maughan, H. Askari, H.M. Zbib, Symposium RR: Scalling Effects in Plasticity, MRS Fall Meeting, Dec. 1 (2014)
69. *Early undergraduate research opportunities: Skills programs for hitting the ground running,*D.F. Bahr, S.K. Burkett, J. Lusth, S.Pressley, K.R. Schnieder, Symposium AAA, Undergraduate Research in Materials Science, MRS Fall Meeting, Dec. 2 (2014)
70. *The effects of solute hydrogen in FCC metals probed with nanoindentation*S.K. Lawrence and D.F. Bahr, TMS 2015 Annual Meeting, Nano- and Micro-Mechanical Measurements in Harsh Environments, March 18 Orlando FL (2015)
71. *Elevated temperature nanomechanical testing to explore size effects in transition metals*D.F. Bahr and M.R. Maughan, **Invited**, Internatinal Materials Resarch Conference XXIV, Cancun, Mexico, Aug. 18 (2015)
72. *If smaller is stronger, is nothing weaker and are two better than one?*D.F. Bahr, **Invited**, Mechanical Engineering Department Seminar, Clarkson University, October 2, (2015)
73. *Composite metallic nanofoam structures*  
    D.F. Bahr, Matthew Howard, Mohamad Zbib, Raheleh Rahimi, Niaz Abdolrahim, T.John Balk, **Invited**, Composites at Lake Louise 2015, Lake Louise, AB Canada, Nov. 10 (2015)
74. *The formation of interfacial intermetallic precipitates in tri-component nanoscale metallic multilayer thin films*D.F. Bahr, R.L. Schoeppner, Aidan Taylor, Johann Michler, Megan Cordill, Hussein Zbib, Symposium U: Microstructure Evolution and Mechanical Properties in Interface-Dominated Metallic Materials, MRS Fall Meeting, Dec. 1 (2015)
75. *If smaller is stronger, is nothing weaker?*D.F. Bahr, **Invited**, Materials Science and Engineering Department Seminar, University of Michigan, Jan. 29 (2016)
76. *If smaller is stronger, is nothing weaker?*D.F. Bahr, **Invited**, Materials Science and Engineering Department Seminar, Drexel University, Feb. 3, (2016)
77. *Temperature and dislocation density effects on size dependent plasticity mechanisms*D.F. Bahr and M.R. Maughan, In operando nano- and micro-mechanical characterization of mateirals with special emphasis on in situ techniques, TMS 2016 Annual Meeting, Feb. 17 (2016)
78. *Pipeline II Panelist*  
    D.F. Bahr, Diveristy in the Minerals, Metals, and Materials Professions Workshop II, Evanston IL, July 25 (2016)
79. *The role of hydrogen in deformation mechanisms near grain boundaries under applied stresses*D.F. Bahr, C.E. Kim, S.K. Lawrence, 2016 International Hydrogen Confernce, Jackson Hole WY, Sept. 14 (2016)
80. *The implications of indentation size (and side) effects in assessing the properties of small molecular crystals and stochastically processed metals*   
    D.F. Bahr, **Invited,** Materials Science and Engineering Department Seminar, University of Pennsylvania, Nov. 10 (2016)
81. *Intrinsic and extrinsic effects of defects on size effects and dislocation nucleation in transition metals*D.F. Bahr and M.R. Maughan, **Invited**, Materials under mechanical extremes, MRS Fall Meeting, Nov. 28 (2016)
82. *Elevated temperature mechanical properties of three component nanolaminate thin films*D.F. Bahr, R.L Schoeppner, J.M. Wheeler, TMS Annual Meeting, Feb. 28, 2017
83. *Development of age-hardenable nanolaminate thin films*D.F. Bahr, CE. Kim, N.J. Briot, T.J. Balk, TMS Annual Meeting, March 1, 2017
84. *Indentation probes for measurements of localized materials properties*D.F. Bahr **Invited**, M.R. Maughan, R.M. Rahimi, TMS Annual Meeting, March 2, 2017
85. *How big should your nanoindentation be?*D.F. Bahr, **Invited**, MSE Department Seminar, Case Western Reserve University, March 21, 2017
86. *Experiments and simulations of double side shot peened aluminum*

S. Ghanbari; D. J. Chadwick; M. D. Sangid and D. F. Bahr, International Conference on Shot Peening 13, Montreal, Canada, Sept. 20, 2017.

1. *Mechanism of shot peening enhancement for the fatigue performance of AA7050*

D.J. Chadwick, S. Ghanbari, D. F. Bahr, and M. D. Sangid, International Conference on Shot Peening 13, Montreal, Canada, Sept. 20, 2017.

1. *Structure And Mechanical Response Of Metallized Electrospun Polymeric Mats And Foams For Filter Applications*David Bahr, Temitope Aminu, Chang-Eun Kim, Raheleh Rahimi, Aiganym Yermembetova **Invited**, Composites at Lake Louise 2017, Lake Louise, Alberta Canada, Nov. 14, 2017
2. *The mechanical response of core-shell metallic nanofoams*  
   C.E. Kim, H. Zbib, N.G. Hightower, H. Ke, I.N. Mastorakos, and D.F. Bahr, TMS Annual Meeting, Phoenix AZ March 12, 2018
3. *Increased materials reliability via shot peening: simulations and experiments*  
   S. Ghanbari, R.M. Rahimi, and D.F. Bahr, **Invited**, TMS Annual Meeting, Integrative Materials Design III, Performance and Sustainability Symposium, Phoenix AZ March 14, 2018
4. *How strong is that squishy metal thing? Structure and mechanical response of low density mats and foams with metal components*

D.F. Bahr, **Invited**, Department of Materials Science and Engineering, University of Virginia, March 19, 2018

1. *Pop-in Behavior during Nanoindentation: Elastic-plastic Transitions Versus Limited Slip Conditions*  
   David F. Bahr, Raheleh M Rahimi, Alexandra C Burch, Michael R Maughan, Sichuang Xue, Xinghang Zhang, MS&T18, Columbus OH October 2018
2. *Polymer Templating for Metallic Foam Fabrication with Wide-Ranging Compositional Control*Chang-Eun Kim, Raheleh M. Rahimi, Ioannis Mastorakos, and David F. Bahr, MRS Fall Meeting, Architected Materials—Synthesis, Characterization, Modeling and Optimal Design, Boston MA Nov. 29, 2018
3. *Copper Nickel alloy foams from polymer templates*David F. Bahr, **Invited**, Changeun Kim, Raheleh M. Rahimi, Ioannis Mastorakos, TMS Annual meeting, San Antonio TX, March 2019
4. *Low density mats and foams with metal components*David F. Bahr, **Invited,** Clarkson University, Mechanical Engineeirng Seminar, March 22, 2019
5. *Low density mats and foams with metal components*

David F. Bahr, **Invited,** University of North Texas, Materials Science and Engineeirng Seminar, April 5,2019

1. *The implications of indentation size and side effects in assessing properties of spatially distinct structures*David F. Bahr, Michael Maughn, Raheleh M. Rahimi, and Samantha Lawrence, **Invited,** Composites at Lake Louise, Lake Louise, Alberta Canada Nov. 12, 2019
2. *The implications of indentation size and side effects in assessing properties of spatially distinct structures*David F. Bahr, Michael Maughn, Rahelh M. Rahimi, and Samantha Lawrence, **Invited,** University of California Riverside Materials Science and Egineering Department Seminar, Jan. 8, 2020
3. *Nanotwins and grain boundaries: Competing roles on the nucleation and propagation of dislocations*Raheleh M. Rahimi, Sichuang Xue, Siavash Ghanbari, Xinghang Zhang, and David Bahr, TMS 2020 Annual Meeting, Mechaical Behavior at the Nanoscale V Symposium, San Diego CA Feb. 25 (2020)
4. *Characterizing residual stress gradients due to shot peening: comparison between x-ray and nanoindentation techniques*Siavash Ghanbari and David Bahr, TMS 2020 Annual Meeting, Advanced Charaterization Techniques for Quantifying and Modeling Deformation Symposium, San Diego CA Feb. 25 (2020)
5. *Structure and mechanical response of low density mats and foams with metal components*David F. Bahr, **Invited,** Texas A&M Materials Science and Engineering Seminar, March 30, 2020
6. *Navigating Towards a Faculty Position in Materials Engineering—Application To Appointment*  
   David F. Bahr, **Invited**, MRS Fall Meeting, Symposius BI01: Early Career Development – Insights from Academia and Industry, November 30 (2020)

**Patents issued**

1. *Piezoelectric Micro-Transducers, Methods of Use and Manufacturing Methods for Same*  
R.F. Richards, D.F. Bahr, and C.D. Richards, Patent 7,235,914 filed October 25, 2001, issued June 26, 2007. Australia issued # 2001297790

2. *Thermal switch, methods of use and manufacturing methods for same*R.F. Richards, D.F. Bahr, and C.D. Richards, Patent 7,411,792, filed November 18, 2003, issued August 12, 2008

3. *Piezoelectric Micro-Transducers, Methods of Use and Manufacturing Methods for Same*  
R.F. Richards, D.F. Bahr, and C.D. Richards, Patent 7,453,187 filed June 7, 2005, issued November 18, 2008.

4. *Piezoelectric Transducers and Associated Methods*D.J. Morris, D.F. Bahr, and M.J. Anderson, Patent 7,710,001, filed Sept. 30, 2008, issued May 4, 2010

5. *Energy converters and associated methods*

D.J. Morris, D.F. Bahr, M.J. Anderson, and J.M. Youngsman, Patent 7,893,599, filed Jan. 29, 2009, issued Feb. 22, 2011

6. *Energy converters and associated methods*D.J. Morris, D.F. Bahr, M.J. Anderson, and J.M. Youngsman, Patent 8,358,049, filed Feb. 18, 2011, issued Jan. 22, 2013

# Program Funding (total $21,053,518; $6,099,000 as PI)

|  |  |  |
| --- | --- | --- |
|  | “Mechanical Probes of Passivating Surfaces Under Potentionstatic Control”, PI Petroleum Research Fund, 6/1/98 - 8/31/01 | |
|  | PRF Summer Research Fellowship for Undergraduate Faculty, 5/15/00- 8/15/00 | |
|  | “Low cost reliable ferroelectric thin films for MEMS”, co-PI with A. Bandyopadhyay, Washington Technology Center, 01/01/98 – 05/31/99 | |
|  | “Oxide Fracture by Indentation to Measure Repassivation Kinetics”, PI  NACE, 7/1/98 – 6/30/00 | |
|  | “REU – Site Characterization of Advanced Materials”, PI (co-PI M.G. Norton)  National Science Foundation, Division of Materials Research, 5/16/99 – 5/15/02 | |
|  | “Processing of PZT and PLZT Thick Films for MEMS”, co-PI with A. Bandyopadhyay, Washington Technology Center, 07/01/99 – 06/30/00 | |
|  | “MEMS Based Power Generation for Portable Systems”, co-PI with R.F. Richards and others  National Science Foundation, Directorate for Engineering, 08/01/99 – 07/31/02 | |
|  | “Verification of Indentation Testing Methodology”, PI  Quad Group Inc., 08/23/99 – 08/15/01 | |
|  | Donations from Hi-Rel Laboratories, Advanced Silicon Materials Inc., Quad Group for support of MSE 426 projects, 01/01/99-05/15/00 | |
|  | "The Role of Defect Structures in Grain Boundaries on the Deformation and Fracture Behavior of Crystalline Solids", co-PI with R.G. Hoagland  Department of Energy, 05/01/99-05/31/01 | |
|  | "Fracture and Residual Stresses in Polycrystalline Silicon", PI  Washington Technology Center and Advanced Silicon Materials Inc., 07/01/00 - 06/30/02 | |
|  | "Development of a MEMS Ultrasonic Transducer for Medical Imaging”, co-PI with A. Bandyopadhyay, Washington Technology Center and Philips Inc., 07/01/00-06/30/02 | |
|  | “Thin Film Fracture and Adhesion Studies”, PI  Sandia National Laboratories, 07/30/00 – 08/15/00 | |
|  | “Measurements of Stress-Strain Behavior on CdZnTe Single crystals to support Modeling and Structure – Property Relationships”, co-PI with S.D. Antolovich, Sandia National Laboratories, 11/17/00 – 9/30/01 | |
|  | “Development of Experimental Verification Techniques for Non-linear Deformation and Fracture: PECASE Award”, PI Department of Energy and Sandia National Laboratories, 7/1/01 – 6/30/06 | |
|  | “The P3 MicroPower Generator”, co-PI with R.F. Richards and C.D. Richards, DARPA 8/16/01-7/31/05 | |
|  | “Textbook Development for a General Education Course on Materials Science” Co-PI with M.G. Norton, National Science Foundation, Division of Undergraduate Education, 2/15/02-2/14/04 | |
|  | “REU – Site Characterization of Advanced Materials”, PI (co-PI M.G. Norton) National Science Foundation, Division of Materials Research, 5/01/02 – 4/30/05 | |
|  | "A Fabrication Facility for MEMS Devices", PI (co-PI R.F. Richards and C.D. Richards) Murdock Charitable Trust, 5/1/03 - 5/1/04 | |
|  | "The P3 Power Generation System for Converting Kinetic to Electrical Energy", PI, Lockheed Martin, Atlanta GA 5/15/03-5/14/04 | |
|  | “The P3 Microengine for Missile Defense Applications” Co-PI with K.G. Lynn, C.D. Richards, and R.F. Richards, US Army Space and Missile Defense Command, 10/1/02-9/30/07 | |
|  | “Research and Engineering Apprenticeship Program”, PI  Academy of Applied Science, 5/1/03-11/1/12 | |
|  | “Integrated Micromachined Strain Sensors”, PI (co-PI M.G. Norton and W.E. Johns) Washington Technology Center and Paine Electronics, 7/1/04-3/30/05 | |
|  | “Utilizing the P3 Piezoelectric Power Generation System for Harvesting Mechanical Vibrations”, PI (co-PI C.D. Richards and R.F. Richards), TPL Inc. Navy STTR subcontract, 7/1/04-04/30/05 | |
|  | “NIRT: Carbon Nanotubes for Thermal Control” Co-PI with C.D. Richards, R.F. Richards D. Chaing, and J. Jiao, National Science Foundation, Division of Chemical and Thermal Systems 8/15/04-8/14/08 | |
|  | “IMR: Acqusition of a FESEM for Characterization of Advanced Materials and Development of Improved EBSD Tools”, co-PI with D.P. Field, M.G. Norton, and J.T. Dickinson 9/1/04-1/7/05 | |
|  | “Meso Sensor Power: Integrating the P3 Microengine with TPL’s Supercapacitor Technologies” PI (co-PI C.D. Richards and R.F. Richards), TPL Inc, DARPA Phase II SBIR Subcontract, 10/1/04-9/30/06 | |
|  | “REU – Site Characterization of Advanced Materials”, PI (co-PI M.G. Norton)  National Science Foundation, Division of Materials Research, 5/01/05 – 4/30/08 | |
|  | “Defects in Single Crystal Optical Applications”, PI (co-PI M.G. Norton)  VLOC Inc., 7/08/05- 6/29/08 | |
|  | “Stress-Strain Behavior and Fracture Mechanisms of Lanthanum Halide Crystals”, Co-PI with K.O. Findley, Sandia National Laboratories, 4/27/06-8/15/07 | |
|  | “Implantable 16-256 Channel Data System for sleep in Mice”, Investigator, with D. Rector, PI, National Institutes of Health, 12/29/05 – 11/30/10 | |
|  | “Deformation and Dislocations in Organic Single Crystals”, PI  Los Alamos National Laboratories, 1/1/06-8/15/07 | |
|  | “Power Generation by Ambient Vibration Harvesting with Multiple Small Footprint, Stable Compliant Micromechanisms”, Co-PI with D.J. Morris, TPL Inc Navy STTR Subcontract 8/1/06-3/31/07 | |
|  | “Development and Implementation of an Intensive Short Course, Seminar, and Mentoring for Introducing Undergraduates to Research in Engineering, PI (co-PI D.P. Field, S. Medidi, B. Lamb, M. Wolcott) National Science Foundation, Division of Undergraduate Education 4/1/07-10/1/09 | |
|  | “Mechanical Behavior of Metallic Films on Compliant Substrates, PI  Sandia National Laboratories 1/12/07-9/30/09 | |
|  | “Vibration harvesting system using an extensional-mode resonator with frequency tuning for powering wireless corrosion sensors”, PI, TPL Inc Navy SBIR Subcontract 1/21/08-6/30/08 | |
|  | “Investigation deformation and failure mechanisms in nanoscale multilayer metallic composites”, Co-PI with H.M. Zbib, F. Akasheh, and S. Medyanik, US Department of Energy Basic Energy Sciences 8/15/07-8/14/10 | |
|  | “REU – Site Characterization of Advanced Materials”, PI (co-PI K.O. Findley)   National Science Foundation, Division of Materials Research, 5/01/08 – 4/30/11 | |
|  | “ARI-MA: From Ce:YAG to Ce:GGG for high energy resolution high efficiency gamma detection - a novel and powerful class of scintillators”, Co-PI with M. Weber and M.G. Norton National Science Foundation, Division of Electrical, Communications and Cyber Systems, 9/15/08-9/15/09:  Department of Homeland Security, 9/16/09-9/15/12 | |
|  | “Development of an instrumented indentation system for evaluation of nuclear materials” PI, Idaho National Laboratory, 11/1/08-9/30/11 | |
|  | “Application of a blast wave sensor for the detection of blast wave overpressure in the screening of mild traumatic brain injury in soldiers”, PI, Brooke Army Medical Center, 6/1/09-12/31/09 | |
|  | “NIRT: Mechanics of NanoTurfs: Multiscale Modeling, Experiments and Characterization” co-PI (PI Sinisa Mesarovic), National Science Foundation, Division of Civil, Mechanical, and Manufacturing Innovation, 6/1/09-5/31/12 | |
|  | “Effects of point defects on dislocation nucleation in metals” PI (co-PI Sergey Medyanik), National Science Foundation, Division of Materials Research, 9/15/09-9/14/12 | |
|  | REU supplement: 2011 | |
|  | “Mechanical properties at the sub-micrometer length scale: multiscale modeling and experiments co-PI (PI Hussein Zbib), National Science Foundation, Division of Civil, Mechanical, and Manufacturing Innovation, 9/1/2010 – 8/31/2013 | |
|  | “Investigation deformation and failure mechanisms in nanoscale multilayer metallic composites” Co-PI with H.M. Zbib, US Department of Energy Basic Energy Sciences 8/15/10-8/14/13 | |
|  | “Characterization of silicon produced by fluidized bed reactors”, PI (co-PI M.G. Norton) REC Silicon, 1/1/11 – 12/31/11 | |
|  | “REU – Site Characterization of Advanced Materials”, PI (co-PI D.P. Field)  National Science Foundation, Division of Materials Research, 5/01/11 – 4/30/14 | |
|  | “The Northwest Advanced Renewables Alliance (NARA): A new vista for green fuels, chemicals, and environmentally preferred products, (Investigator for education and undergraduate research, PIs Michael Wolcott and Norman Lewis) US Department of Agriculture, 7/1/11-6/30/6. Total $40M, only showing education portion | |
|  | “EURO – Early Undergraduate Research Opportunities” PI Collaborative proposal with U. Central Florida and U. Alabama ($500K total). National Science Foundation, Division of Undergraduate Education, 9/30/11 – 9/29/14 | |
|  | “Testing properties of hard drawn copper wire” PI  Avista Utilities, 12/15/11 – 1/31/12 | |
|  | “Wear resistant materials for electrical contacts” PI Sandia National Laboratories, 2/16/12 – 8/31/14 | |
|  | “Assessing mechanical behavior of oxide films on metals” PI  Sandia National Laboratories, 4/1/11-8/31/13 | |
|  | “Nanomechanical testing of nanoscale metallic multilayer thin films”, PI subcontract to Purdue through WSU from US Department of Energy Basic Energy Sciences, 8/1/13 – 5/30/14 | |
|  | “Testing DLC coatings using nanoindentation” PI, IBC Corporation, Lebanon IN | |
| 56 | “Residual stress analysis in injection molded polymers: local property characterization and molecular simulations”, co-PI (w A. Strachan), Lilly Research Laboratories 12/13-3/14 | |
| 57 | “Developing a magnetically addressable hard coating for digital recording of position”, PI Scot Industries, 7/1/14-6/30/15 (50% to Carlos Martinez) | |
| 58 | “Nanoscale measurements for molecular crystals: Scaling up by testing small”, PI, AstraZeneca 7/1/14-10/31/14 | |
| 59 | “Nanoindentation assessment of localized property changes due to novel surface treatments of steels”, PI, IBC Corporation, Lebanon IN (1/1/15-6/20/15) | |
| 60 | “Center for Surface Enhancement Engineering”, PI, Electronics Inc (9/1/15-9/1/16); gift fund | |
| 61 | “Permanent Marking Methods for Pipeline Carbon Steel using Laser Processing”, PI (co-PI, 50% to Gary Cheng) Hydril Corporation (1/1/16-6/30/16) | |
| 62 | “Nanomechanical testing of energetic materials to quantify and rank sensitivity “ PI Air Force Office of Scientific Research (2/1/16-12/31/16) | |
| 63 | “Workshop: Training the Trainers in Pre-Research Coursework”, Collaborative proposal of $50,000, National Science Foundation DUE (6/15/16-12/31/17) | |
| 64 | “Collaborative Research: Strengthening metallic nanofoams through ligament scale materials design”, National Science Foundation ENG:CMMI: PI (co-PI I. Mastorakos, Clarkson University), total $620,793 (10/1/16-9/30/19) | |
| 65 | “Center for Surface Engineering and Enhancement”, Cummins Inc. (1/1/17-12/1/17); gift fund | |
| 66 | “Designing 2D nanostructured metals for age hardenability”, National Science Foundation DMR: PI (8/1/17-7/3/20) | |
| 67 | | “Nanoindentation of mock materials for mechanical property evaluation”, Los Alamos National Laboratory, PI (7/1/17-12/31/17) |
| 68 | | “Bio-Enabled Lightweight Metallic Structures with Ultrahigh Specific Strengths for Reduced Weight, Energy Use, and Emissions”, co-PI (PI Ken Sandhage) 4/1/18-3/31/19 |
| 69 | | “Acquisition of an X-ray Diffraction system for residual stress determination”, Purdue University Office of the Executive Vice President for Research, PI (3/15/18-6/30/18) |
| 70 | “Nanoindentation of high density molecular materials for mechanical property evaluation”, Los Alamos National Laboratory, PI (12/16/18-5/30/19) | |
| 71 | “Materials Science and Engineering Educational Advances Workshop”, National Science Foundation, DMR, PI (8/15.2018-8/14/21) | |
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## Student and Researcher Advising

**Graduate Students and Postdoctoral Researchers (currently advising 4 graduate students)**

### **Postdoctoral Researchers**

### Dr. Dylan Morris, PhD Materials Science, University of Minnesota (August 2004-July 2007) Research Scientist, Michelin Corp.

Dr. Aikaterini Bellou, PhD Engineering Science, Washington State University (Nov. 2009 – July 2010) Adjunct Professor, Clarkson University

Dr. Mohsen Damadam, PhD Mechanical Engineering, Washington State University (June 2018-November 2019)

Dr. Siavash Ghanbari, PhD Materials Science Engineering, Purdue University (November 2019 – June 2021)

**PhD Committee Chair and current positions if known (29 students in process or graduated)**

At Washington State University

Dr. Liping Ren, Materials Science “In situ Observation and Modeling of Ga Penetration on Al Grain Boundaries and Al-Cu Interfaces” (October 2000)

Dr. Mengzhi Pang, Materials Science “Fracture and Deformation of Brittle Materials Using In-Situ Indentation Testing” (Dec. 2001) Technical Staff Member, Apple Computer, Cupertino CA

Dr. Kevin Nibur, Materials Science “Nanoindentation Slip Steps and Hydrogen Embrittlement” (August 2005) Owner, Hy-Test Labs, Bend OR

Dr. Abdulaziz Al-Amr, Materials Science “Mechanical Behavior and Structure of Passive Films on Austenitic Stainless Steels” (May 2005) Faculty Member, College of Technology, Riyadh, Saudi Arabia

Dr. Marian S. Kennedy, Materials Science “Mechanical Properties and Failure in Thin Films” (May 2007) Associate Professor, Clemson University

Dr. Michelle Robinson, Materials Science “Electromechanical Properties of Thin Perovskite Films (December 2007) Adjunct Instructor, Washington State University School of Mechanical and Materials Engineering, currently on indefinite maternity leave

Dr. Kyle Ramos, Materials Science “Dislocations and Deformation in Organic Single Crystals” (May 2009) Technical Staff Member, Los Alamos National Laboratories, Los Alamos, NM

Dr. John Youngsman, Engineering Science, “An Extensional Mode Resonator for Vibration Harvesting” (May 2009) Assistant Research Professor, Boise State University

Mr. Gus Vasquez, Materials Science “Indentation Testing for Thin Film Fracture and Dislocation Nucleation” (did not graduate)

Dr. Aikaterini Bellou, Engineering Science “Structural Defects and Properties of Multicomponent Materials” (Dec. 2009) Adjunct Professor, Clarkson University

Dr. John Yeager, Engineering Science, “Mechanical Response of Organic-Inorganic Interfaces” (August 2011) Technical Staff, Los Alamos National Laboratories, Los Alamos, NM

Dr. Yoonkap Kim, Engineering Science, “Compliant Materials for MEMS Contacts and Interconnects” (May 2012) currently Post Doc Korea Institute of Machinery and Materials

Dr. Iman Salehinia, Mechanical Engineering, co-advised with S. Medyanik “Atomistic Simulation Study Of The Effects Of Point Defects On The Inception Of Plastic Deformation In Metals” (May 2013) Assistant Professor, Mechanical Engineering, Northern Illinois University

Dr. Anqi Qiu, Engineering Science “Fabrication and Characterization of Carbon Nanotube Turfs” (May 2013) Staff engineer, Hysitron Inc., Minneapolis MN

Dr. Rachel L. Schoeppner, Materials Science and Engineering, “Nanoscale Strengthening Mechanisms In Metallic Thin Film Systems” (December 2014) Postdoctoral researcher, Coloradao School of Mines and National Energy Technology Laboratory

At Purdue University

Dr. Samantha K. Lawrence, Materials Science and Engineering, “Assessing Coupled Mechanical Behavior And Environmental Degradation At Submicron Scales” (Jan. 2015) Staff member, Los Alamos National Laboratory

Dr. Mohamad Zbib, Materials Science and Engineering, “Characterization And Mechanical Properties Of Solar Grade Silicon In Granular And Nanopowder Form” (Feb. 2015). Assistant Professor, Mechanical Enginering, Phonecia University, Lebanon

Dr. Nannan Tian, Materials Science and Engineering, “Quasi-static and dynamic nanoindentation on soft and spatially distinct materials and structures” (Aug. 2015) Test and Design Engineer, KLA-Tencor

Dr. Michael Maughan, Materials Science and Engineering, “Microstructural and morphological factors affecting uncertainty in small scale mechanical properties” (Aug. 2015) Assistant Professor, Mechanical Engineering, University of Idaho

Dr. Thomas Kanaby, Materials Science and Engineering, “Cyclic nanoindentation investigation of plasticity in case hardened bearing steels” (December 2017) Research Engineer, CPM Corporation, Crawfordsville IN

Dr. Jesus Hector Morales Espejo, Materials Science and Engineering, “Antimicrobial peptide adsorption and storage on oxidized metal surfaces to mitigage bacterial attachment” (December 2018) Lecturer, Western Colorado University

Dr. Cheng-Eun Kim, Materials Science and Engineering, “Atomistic simulations and microscopy experiments to understand nanoscale composition control”, (December 2018) Post Doc, Lawrence Livermore National Laboratories

Dr. Raheleh Rahimi, “Micromechanical analysis and characterization of materials with spatially distinct microstructural features”**,** Materials Science and Engineering (November 2019), Post Doc, Purdue University

Dr. Siavash Ghanbari, “Investigation of Residual Stresses after Shot Peening Processing”,Materials Science and Enginering (November 2019), Post Doc, Purdue University Center for Surface Engineering Enhancement

Dr. David Brice, “Application of surface severe plastic deformation to and  titanium alloys for microstructure modification” Materials Science and Engineering (October 2019), co-chaired with Kevin Trumble, Research Engineer, ATI Corp.

Dr. Alexandra Burch, “Small scale testing to assess mechanical behavior of anisotropic molecular crystals”,Materials Science and Engineering (March 2020), Post Doc, Los Alamos National Laboratory

Dr. Zara Molina, “Multi-Scale Analysis And Simulation In 3D Crystal Plasticity Large Deformation Finite Element Platforms to Predicting and Designing Thermomechanical Responses of Metallic Nano-Layers”, Materials Science and Engineering (December 2020)

Mr. Temitope Aminu, Materials Science and Engineering (predicted 2021)

Mr. Jung-Ting Tsai, Materials Science and Engineering (predicted 2021)

Ms. Yailuth Alexandra Loaiza Lopera, Materials Science and Engineering (predicted 2022)

**MS Committee Chair (30 students)**At Washington State University

1. Mr. Parag Banerjee, Materials Science and Engineering “Sol-Gel derived PZT,PLZT, and PNZT thin films” (June 2000) co-chair with A. Bandyopadhyay
2. Mr. Brian Crozier, Materials Science and Engineering “Reliability of MEMS: Friction, Fracture and Fatigue” (Dec. 2000)
3. Ms. Christy Woodcock, Materials Science and Engineering “ Plastic Deformation in Novel Nanoindentation Experiments” (May 2002)
4. Mr. Bennett Olson, Materials Science and Engineering “Optimization of a Piezoelectric Membrane Generator” (June 2002)
5. Mr. Ryan Brodie, Materials Science and Engineering “Fracture of Polycrystalline Silicon” (June 2002)
6. Ms. Megan Jo Cordill, Materials Science and Engineering “Adhesion of Thin Ductile Films using Stressed Overlayers and Nanoindentation” (May 2003)
7. Mr. Adam Olson, Materials Science and Engineering “Processing and Properties of a Piezoelectric Membrane Generator” (May 2003)
8. Ms. Lee Eakins, Materials Science and Engineering “Development and Characterization of Materials in MEMS Power Generation” (May 2003)
9. Ms. Marian S. Kennedy, Materials Science and Engineering “Mechanical Property Determination of Thin Films for PZT MEMS Applications” (December 2003)
10. Mr. Diego Rodriguez-Marek, Materials Science and Engineering “Indentation Induced Fracture” (December 2003)
11. Ms. Julia Martinez, Materials Science and Engineering “Development of Doped Piezoelectric and Texture Control in Films for MEMS Power Generation” (August 2004)
12. Mr. Timothy Sullivan, Materials Science and Engineering “Measurements of Thin Film Piezoelectric Properties” (August 2004)
13. Mr. Kevin Morasch, Materials Science and Engineering “Nanoindentation Induced Thin Film Fracture” (May 2005)
14. Mr. Phillip Hayenga, Materials Science and Engineering “Fabrication Methods to Improve Performance of a Piezoelectric Membrane Generator” (Dec. 2005)
15. Mr. Kiwon Chung, Materials Science and Engineering “Fabrication and Characterization of a Metallic Strain Gauge Using MEMS Techniques” (Dec. 2005)
16. Mr. Shinchiro Yoshizawa, Materials Science and Engineering “Mechanical and Chemical Stability of Adhered Mercury Droplets for a MEMS Thermal Switch” (May 2006)
17. Ms. Coralee McCarter, Materials Science and Engineering, “Mechanical Properties of Vertically Aligned Carbon Nanotubes for Use in a Thermal Switch” (May 2006)
18. Mr. Yoonkap Kim, Materials Science and Engineering, “Fabrication and Characterization of Low Melting Temperature Metal MEMS Switches”, (Dec. 2007)
19. Mr. Ali Zbib, Mechanical Engineering, “Mechanics of Vertically Aligned Carbon Nanotubes in Contact”, (Dec. 2007)
20. Mr. John Yeager, Materials Science and Engineering, “Flexible Electronics for Neuroscience Applications”, (Aug. 2008)
21. Mr. Ryan Johnson, Materials Science and Engineering, “Thermocompression Bonding of Carbon Nanotube Structures”, (Dec. 2008)
22. Ms. Megan Dahl, Materials Science and Engineering, “Microstructure of Polycrystalline Silicon from Fluidized Bed Reactors”, (May 2008)
23. Ms. Nicole Overman, Materials Science and Engineering, “Mechanical Testing of Nanolaminate Composites”, (August 2008).
24. Mr. Elias Njeim, Mechanical Engineering, “Defects in Metals and Simulation of Mechanical Properties by Means of Nanoindentation”, (Dec. 2009).
25. Mr. Chinhui “Bruce” Chang, Materials Science and Engineering, “Acoustic Transducers Based on Curved Membranes”, (August 2010)
26. Ms. Nichole Falk, Materials Science and Engineering, “Indentation Testing Development for Materials Exposed to Radiation”, (May 2011)
27. Ms. Jessica Parsons, Materials Science and Engineering, “Mechanical Behavior of Micromechanical Devices”, (August 2011)
28. Mr. Yifan Zhu, Materials Science and Engineering, “Strength Enhancemens of Cu/Cr Multilayer Thin Films with Precipitates”, (August 2013)
29. Mr. Bo Li, Materials Science and Engineering “The Effects of Solid Solution Impurities Corresponding to Stacking Fault Energy on Nanoindentation Behavior in Crystalline Solids” (Dec. 2013)

At Purdue University

1. Mr. Matthew Taw, Materials Science and Engineering “Linking Nanoscale Mechanical Behavior To Bulk Physical Properties And Phenomena Of Energetic Materials” (Dec. 2017)

**Undergraduate Students Mentored**

At Washington State University

Over 50 undergraduates in MSE 499 or MSE 425/426/499. Several of these projects are the basis of the publications in the preceding sections.

At Purdue University

Jennifer Fifer “Mechanical Testing of Molecular Organics and Shot Peened Surfaces”, Summer 2016