

KATAYUN (KATY) BARMAK

Department of Applied Physics and Applied Mathematics
Seeley W. Mudd Building
Columbia University
500 West 120th Street, Suite 200
New York, NY 10027
Tel: (212) 854-8267

E-mail: katayun.barmak@columbia.edu or kb2612@columbia.edu
URL: <http://apam.columbia.edu/katayun-barmak>

EDUCATION

Ph.D., Materials Science, Massachusetts Institute of Technology, 1989
M.A., University of Cambridge, England, 1987
S.M., Metallurgy, Massachusetts Institute of Technology, 1985
B.A., Materials Science, 1st Class Honours, University of Cambridge, England, 1983

PROFESSIONAL EXPERIENCE

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| 2013-present | Director, Materials Science and Engineering Program, Dept. of Applied Physics and Applied Mathematics, Columbia University |
| 2011-present | Philips Electronics Professor of Applied Physics and Applied Mathematics and Materials Science and Engineering, Columbia University |
| 2002-2011 | Full Professor with indefinite tenure, Carnegie Mellon University |
| 1999-2002 | Associate Professor with indefinite tenure, Carnegie Mellon University |
| 1997-1998 | Associate Professor with indefinite tenure, Lehigh University |
| 1995-1998 | Co-director, Thin Film Laboratory, Materials Research Center, Lehigh |
| 1992-1997 | Assistant Professor, Lehigh University |
| 1989-1992 | Staff Engineer, Advanced Device Development, IBM T. J. Watson Research Center and IBM East Fishkill, New York. R&D of materials, processes and structures for advanced generations of bipolar junction and field effect transistors |

Since joining Columbia in 2011, I have established the central Electron Microscopy (EM) user facility, and I am now leading the establishment of a new thin films X-ray Diffraction Laboratory. The EM facility is now part of the Columbia Nano Initiative suite of user facilities and includes scanning and transmission electron microscopes in addition to instruments for sample preparation. I led the 6-year, \$4 million effort on instrument purchase, room design and renovation and installation of a Talos F200X transmission electron microscope, in addition to the purchase of the scanning electron microscopes and sample preparation instruments. I have continued to contribute

to the upgrade of the facilities, with the Columbia Talos being the first instrument of its kind in the world to have the NanoMEGAS precession electron diffraction system installed in April 2018. A link to the video showcasing the Talos F200X can be found on my webpage at <http://apam.columbia.edu/katayun-barmak>.

To train Columbia students in the theory and practice of transmission electron microscopy, I developed and teach the Transmission Electron Microscopy course. In addition to the classroom lectures, this course includes nine hands-on sessions on the Talos.

Since becoming the Director of the Materials Science and Engineering Program in the Department of Applied Physics and Applied Mathematics in 2013, I have successfully led the implementation of a new curriculum at both the undergraduate and graduate levels. The new curriculum includes two new hands-on laboratory courses for undergraduates and a new laboratory course for graduate students. Additionally, I have established the MSE laboratory as a shared user facility in addition to being a teaching facility for structural, microstructural and mechanical properties characterization of materials. I continue to lead the effort in bringing in new instruments into the facility. The facility description can be found at <http://mseshared.apam.columbia.edu/>.

HONORS AND AWARDS

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| 2017 | Edward and Carole Kim Faculty Involvement Award, School of Engineering, Columbia University The Kim Award, established in 2000 by Edward and Carole Kim, was created to honor a faculty member who is not only an excellent teacher, but who also shows a special, personal commitment to students. |
| 2016 | Meeting Chair, 13 th Joint Magnetism and Magnetic Materials and InterMag Conf. |
| 2009 | Philbrook Prize in Engineering, Carnegie Mellon University Awarded for substantial, sustained contributions to excellence in education, or to the application of materials science to important problems. |
| 2004 | IBM Materials Research Community Visiting Scientist, IBM T. J. Watson Research Center (one of only two faculty awards made worldwide) |
| 1998-2003 | Visiting Scientist, IBM T.J. Watson Research Center |
| 2001 | NSF Creativity Award |
| 1999 | Meeting Chair, Materials Research Society, Spring 1999 |
| 1999 | IBM Faculty Fellowship Award |
| 1998-2000 | Materials Research Society Council, elected member |
| 1995 | Alfred Noble Robinson Award, Recognizing outstanding performance in the service of the university and unusual promise of professional achievement, Lehigh University |
| 1994 | National Young Investigator (NYI) Award, National Science Foundation |
| 1994 | Deutsche Forschungsgemeinschaft Fellowship Institute of Materials, GKSS Research Center, Geesthacht, Germany |
| 1992-1993 | Harold Chambers Junior Faculty Chair of Materials Sc. and Eng., Lehigh |
| 1986-1989 | AT&T Foundation Fellowship |
| 1985 | Elected to Sigma Xi, Science Honor Society |

1983 New Hall Prize for academic excellence, University of Cambridge
1981-1983 Posener Academic Scholarship, New Hall, University of Cambridge

MEMBERSHIP OF PROFESSIONAL SOCIETIES

IEEE, Materials Research Society (MRS); American Physical Society (APS), The Minerals, Metals, Materials Society (TMS); ASM International (ASM), Microscopy Society of America (MSA); Microbeam Analysis Society (MAS); American Association for the Advancement of Science (AAAS); New York Academy of Science (NYAS); American Society for Engineering Education (ASEE), Sigma Xi, Society for Industrial and Applied Mathematics (SIAM)

TEACHING EXPERIENCE

Columbia University

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| MSAE E4100 (<i>New</i>) | Crystallography (F13, F14, F15, F16, F17, F18) |
| MSAE E4101 | Structural Analysis of Materials (F13, F14) |
| MSAE E4215 | Mechanical Behavior of Materials (S13, S14) |
| MSAE E4201 (<i>New</i>) | Materials Thermodynamics and Phase Diagrams (S16, S19) |
| MSAE E6100 (<i>New</i>) | Transmission Electron Microscopy (S17, S19) |

Carnegie Mellon University

Undergraduate Courses

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| 27-100 | Materials in Engineering (F99, S00, F00, S05, S06) |
| 27-202 | Defects in Materials (F01, F03) |
| 27-217 | Phase Relations and Diagrams (S01, S07, S08, S09, S10) |
| 27-302 (<i>New</i>) | Microstructure and Properties II (F03, F04, S06, S07) |
| 27-530 | Advanced Physical Metallurgy (S00) |

Graduate Courses

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| 27-780 | Thermodynamics (F08) |
| 27-799 | Thermodynamics II (F09, F10) |
| 39-610 (<i>New</i>) | Energy Conversion and Supply (F10) |

Non-FCE Courses

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| 27-401 | Senior Design Class (Supervised student project) |
| 27-774 | Graduate Seminar (F06, S07, F07, S08, F08, S09) |

Lehigh University

Undergraduate Courses

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| MAT33 | Engineering Materials and Processes (S94, S95, S97, F97×2 (taught two sections), S98) |
| MAT216 | Diffusion and Phase Transformations (F96, F97) |
| MAT312, ChE312, CHM312(<i>New</i>) | Fundamentals of Corrosion (S93, S95, S97) |
| MAT367, ChE367 (<i>New</i>) | Metal Films and Coatings: Processing, Structure, Properties (Co-taught with Chemical Eng.) (S94) |

Graduate Courses

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| MAT401 | Thermodynamics and Kinetics I (F93, F94, F95) |
| MAT412 (<i>New</i>) | Magnetic Properties of Materials (F93) |

Laboratories

Renovated, set up and upgraded an undergraduate X-ray diffraction laboratory in Whitaker.

Short Courses and Other

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| Lehigh Microscopy Short Course | Scanning electron microscopy laboratories (S93, S94, S95, S96) |
| Guest lecture, Engineering 1 - (Undergraduate) | Engineering Computations (F96) |
| Guest lectures on thin film reactions | Phase Transformations (F96) |
| MAT408 (Graduate) | |

For courses marked as “New”, I developed a new course, which included notes, problem sets, examinations and team projects depending on the content of the course.

RESEARCH INTERESTS

Synthesis and characterization of transition metal dichalcogenides; synthesis, processing, properties, crystal structure, grain structure, and texture of metallic films for electronic and magnetic applications; thermodynamics and kinetics of solid state reactions and phase transformations in nanostructured films. Grain boundaries, grain growth and microstructural evolution. Characterization techniques of interest include differential scanning calorimetry (DSC), X-ray and electron diffraction (XRD, ED), and electron microscopy (SEM, TEM, STEM) and crystal orientation mapping.

RESEARCH PROGRAM FUNDING

55. PI, “Thermoelectric Phenomena in Quasi-One-Dimensional Metals, AFOSR FA9550-18-1-0063, \$468,000 (1/1/2018-12/31/2020), Co-PI: K. R. Coffey, E. Mucciolo, P. Schelling (Univ. of Central Florida).

54. PI, “Energy Efficient Computing: From Devices to Architecture (E2CDA): Type I: Collaborative Research: Interconnects Beyond Cu”, NSF ECCS 1704270 and SRC 2764.001-004, \$393,253/\$999,999 (9/1/2017-12/31/2020). Co-PI: A. West, C. V. Thompson (MIT), D. Gall

(RPI), K. R. Coffey, W. Kaden, T. Jiang, E. Mucciolo, P. Schelling (Univ. of Central Florida).

53. Co-PI, “SuSCheM: Environmentally Sustainable Pathways for Extracting Valuable Elements from Electronic Wastes, NSF CBET 1706905, \$300,000 (9/1/2017-8/31/2020), PI: A. Park, Co-PI: A. West.

52. PI, “Materials and Structures for Pressure Sensors”, Kulite Inc., \$138,884 (9/1/2017-8/31/2018). Co-PI: I. C. Noyan.

51. PI, “Materials and Structures for Pressure Sensors”, Kulite Inc., \$132,207 (9/1/2016-8/31/2017). Co-PI: I. C. Noyan.

50. Co-PI, “Precision Assembly of Superstratic and Superatomic Solids”, NSF DMR-1420634 MRSEC, \$98,000 (7/1/2018-6/30/2019), \$86,800 (7/1/2017-6/30/2018), \$141,901 (7/1/2016-6/30/2017), \$67,700 (7/1/2015-6/30/2016) PI: James Hone.

49. PI, Silicon Valley Community Foundation, unrestricted gift, \$25,000 (11/16/2016).

48. PI, LAM Research Corporation, unrestricted gift, \$40,000 (6/9/2014).

47. Co-PI, “Epitaxial Growth of Metallic Conductors for Deeply Scaled Interconnects”, Semiconductor Research Corporation 2581.001, \$27,149 (12/1/2014-6/30/2016), PI: K. R. Coffey, Co-PI: P. Schelling (UCF), SRC 2580.001, \$97,730 (12/1/2014-1/31/2017).

46. PI, REU Supplement, Collaborative Research: Towards Rare-Earth-Free Advanced Permanent Magnets – High-Anisotropy L₁₀ Materials”, NSF CMMI-1259736, \$10,000 (04/14/2014-08/31/2014).

45. Co-PI, “Ultrathin Intermetallic Phases for Giant Spin Hall Effect”, NSF DMR-1411160, \$419,994, (9/1/2014-8/31/2017). PI: William Bailey.

44. Co-PI, “Co, Ni, Ru and W as Alternate Interconnects for sub-30 nm Linewidths”, Global Research Corporation/Semiconductor Research Corporation, TEL Customization funding, SRC 2323.001, \$271,000 (7/1/12-12/31/14). Co-PI: Kevin R. Coffey (UCF).

43. Co-PI: “Oriented, single-crystal nanowires for interconnects: A theoretical investigation”, Semiconductor Research Corporation 2361.001, \$0/\$40,000 (10/1/12-12/31/14). PI: Patrick Schelling, Co-PI: Kevin R. Coffey (UCF).

42. Co-PI, “Multiscale Development of L₁₀ Materials for Rare-Earth-Free Permanent Magnets”, ARPA-E REACT Grant # 0472-1537, \$245,000/2,800,000 (11/1/11-09/30/2013). PI: Laura H. Lewis (NEU), other Co-PIs: Vincent Harris (NEU), Jeffrey E. Shield, Ralph. Skomski (UNL), Joseph. Goldstein (UMass, Amherst), Frederick Pinkerton (GM), Steven Constandinidis (Arnold Magnetics)

41. Co-PI: Collaborative Research: Towards Rare-Earth-Free Advanced Permanent Magnets –

High-Anisotropy L₁₀ Materials”, NSF CMMI-1129313, \$159,041/465,900 (9/1/11-8/31/14). Co-PIs: Laura. H. Lewis (NEU), Jeffrey E. Shield (UNL).

40. PI, “High Throughput Electron and X-ray Diffraction Based Metrology of Nanocrystalline Materials”, Global Research Corporation/Semiconductor Research Corporation, SRC 2121.001, \$300,000 (2/1/11-1/31/14). Co-PI: Kevin R. Coffey (UCF).

39. PI, “Quantitative Kinetic Experiments and Models of L₁₀ Formation in FePt, CoPt and Related Alloy Films”, Information Storage Industry Consortium, Extremely High Density Recording Program, \$35,000 (1/1/10-12/31/10), \$17,500 (1/1/11-5/31/11).

38. Co-PI, “Electron Microscopy of Hard Coatings and Other Tool Materials”, Kennametal Inc., \$164,000 (02/01/09-01/31/11). PI: Paul Salvador (CMU).

37. PI, “Automated, Quantitative Microstructural Characterization of Nanometric Metals”, Intel, \$28,000 (2/1/09-12/31/09).

36. PI, “The A1 to L₁₀ Transformation in FePt Films with Ternary Alloying Additions”, NSF DMR-0804765, \$330,000 (7/1/08-6/30/12).

35. PI, “Thermodynamics and Kinetics of the A1 to L₁₀ Transformation in FePt and Related Ternary Alloys for Ultrahigh Density (1 Tb/in²) Magnetic Recording Media: Differential Scanning Calorimetry”, Seagate Technology/DSSC, \$68,000 (01/01/08-12/31/08).

34. Co-PI, “Ordered Intermetallics for Ultrahigh Density Hard Disk Drives (HDD) and for Microelectromechanical Systems (MEMS)”, PITA, \$23,898 (09/01/06-05/31/08). Co-PI: Gary Fedder (CMU).

33. Co-PI, “Electron Microscopy of Hard Coatings and Other Tool Materials”, Kennametal Inc., \$140,000 (8/1/06-7/31/08). Co-PI: P. Salvador (CMU).

32. PI, “Thermodynamics and Kinetics of the A1 to L₁₀ Transformation in FePt and Related Ternary Alloys for Ultrahigh Density (1 Tb/in²) Magnetic Recording Media: Differential Scanning Calorimetry”, Seagate Technology, \$79,792 (09/01/06-08/31/07).

31. PI, “Resistivity of Cu Interconnects: Grain Growth in Films and Lines”, Intel, \$70,000, (7/1/06-6/31/08).

30. Co-PI, “Reaction Kinetics of Nickel with Pb-free Sn-Bi-In-Zn-Sb Solders”, US CRDF, \$75,900 (of which \$15,180 is Subcontract to CMU) (03/01/06-02/29/08). PI: Vasyl Dybkov, Institute for Problems of Materials Science, Kyiv, Ukraine.

29. Co-PI, “Carnegie Mellon Materials Research Science and Engineering Center”, NSF DMR-0520425, \$6,500,000 (9/1/05-8/31/11). PI: Gregory S. Rohrer (UCF).

28. PI, “The A1 to L₁₀ Transformation in FePt, CoPt and Related Ternary Alloy Films”, NSF

DMR-0506374, \$285,000 (7/1/05-6/30/08).

27. Co-PI, “Electrical Resistivity of Sub-45nm Interconnects: The Classical Size Effect”, Semiconductor Research Corporation Task 1212.008, \$330,000 (\$154,153 Subcontract CMU) (02/01/05-01/31/08). PI: Kevin R. Coffey (UCF).

26. Co-PI, “Lab Facilities Computing Upgrade”, Intel Corporation \$46,101, (06/05). PI: Robert Heard (CMU).

25. PI, “Calorimetric Studies of Single- and Multi-Layer Thin Films in Recording Technology” Seagate \$70,000, (7/1/03-6/31/04).

24. PI, “Calorimetric Studies of Single- and Multi-Layer Thin Films in Recording Technology” Seagate \$62,000, (7/1/02-6/31/03).

23. Co-PI, “Silicide quantum dots for nanoelectronics”, NSF ECS-0210647, \$89,871 (7/15/02-1/14/04). PI: David Greve (CMU).

22. Co-PI, “Impact of dislocations on a phase transformation: simulation of microstructural evolution”, PTIA, \$55,500 (9/01-12/02), Collaborator, Jeffrey Rickman (Lehigh University).

21. Co-PI, “Magnetic Tunnel Junctions for the Magnetic Random Access Memory”, Pennsylvania Digital Greenhouse, \$300,000, (9/01-8/04), PI: Robert White. Other Co-PIs: Jiangang Zhu, and Robert Hoberg (CMU).

20. PI, “Calorimetric Studies of Single- and Multi-Layer Thin Films in Recording Technology”, Seagate \$55,000, (7/01-6/02).

19. PI, “Creativity Award – Microstructure Evolution in Thin Film: Cu alloys and microcalorimetry, NSF DMR-9996315, \$224,793 (9/01-8/03).

18. PI, “Calorimetric Studies of Single- and Multi-Layer Thin Films in Recording Technology” Seagate \$57,000, (7/00-6/01).

17. PI, “Magnetic Properties of L1₀ Alloys”, Data Storage Systems Center, Carnegie Mellon University, \$80,000, (9/00-8/01).

16. Co-PI, “Materials Research Science and Engineering Center”, NSF DMR-0079996, \$4,300,000, (9/00–8/05). PI: Gregory Rohrer, other Co-PI’s: Brent L. Adams, David Cassant, David Kinderlehrer, Anthony D. Rollett, Robert Suter, Shlomo Ta’asan (CMU).

15. Co-PI, “Development of Equipment for Fabrication of Quantum Cellular Automata”, NSF ECS-0079485, \$209,867, CMU cost sharing \$100,000, (9/00-8/01). PI: David Greve.

14. Co-PI, “Collaborative to Integrate Research and Education (CIRE)” with Florida A&M University (FAMU), Co-PI, NSF, \$150,748 (sub-contract from FAMU), (9/99-8/02). PI: H.

Garmestani (FAMU).

13. Co-PI (starting in 1999), National Science Foundation, “Materials Research Science and Engineering Center – Mesoscale Interface Mapping Project”, \$3,567,000, (5 yrs, 9/96-8/00), PI: Brent L. Adams, David Cassasent, David Kinderlehrer, Anthony D. Rollett, Robert Suter, Shlomo Ta’asan (CMU).

12. PI, IBM, “University Partnership Program”, \$40,000, (1 yr, 9/99-8/00).

11. Co-PI, Sandia National Laboratory, “Automated Analysis of Electron Micrographs”, \$20,989 (3 mos., 7/98-9/98). Co-PI: Jeffrey M. Rickman (Lehigh).

10. PI, National Science Foundation (NSF), DMR-9713439 Amendment, “REU - “Evolution of grain structure in thin film reactions”, \$5000 (0.5 years, 3/98-10/98). Co-PI: Jeffrey M. Rickman (Lehigh).

9. PI, National Science Foundation (NSF), DMR-9713439, “Evolution of grain structure in thin film reactions”, \$369,706 (4 years, 11/97-10/01). Co-PI: Jeffrey M. Rickman (Lehigh).

8. Co-PI, National Science Foundation (NSF), DMR-9626279, “Acquisition of an automated digital transmission electron microscope”, \$709,300 (2 years, 8/96-7/98) and \$450,000 matching funds from Lehigh University. PI: David A. Smith. Co-PIs: Katy Barmak, Helen M. Chan, Charles E. Lyman, Jeffrey. M. Rickman, and David B. Williams (Lehigh).

7. PI, Brookhaven National Laboratory (BNL) 725057, primary contract Department of Energy (DoE) New Initiative DE-AC02-76CH00016, “Magnetic exchange coupling in layered thin-film composites of hard and soft ferromagnets: role of processing and structure”, \$125,643 (2/96 – 7/00)

6. Co-PI, Department of Energy (DoE), "Environmental scanning electron microscope - Research Instrumentation Grant", \$245,120 and \$91,800 matching funds from Industry and Lehigh University (1/95-6/97). PI: A. Marder. Other Co-PIs: Katy Barmak, and David B. Williams (Lehigh).

5. PI, National Science Foundation (NSF), DMR-9458000, National Young Investigator award (NYI), \$500,000 (5 years, 9/94-8/00)) and the following matching funds from companies.

Hoeganaes, \$27,000 (1998-99)

TA Instruments, \$50,000 (1997)

AMP, Inc. \$22,000 (1996)

Perkin Elmer \$9631 (1996)

Penkem, Inc. \$45,000 (1995)

Tencor, Inc. \$55,225 (1994)

TA Instruments, Inc. \$7048 (1994)

IBM, \$5000 (1994)

4. PI, National Science Foundation (NSF), DMR-9411146, "Acquisition of an ultrahigh vacuum

sputtering system for the preparation of nanostructured metal films", \$196,450 (2 years, 6/94-11/96), and \$125,000 matching funds from Lehigh University.

3. PI, National Science Foundation (NSF), DMR-9308651, "Role of grain structure and grain boundary diffusion in thin film reactions", \$238,000 (3 years, 12/93-5/97).

2. Co-PI, National Science Foundation (NSF), DMR-9256332, "Graduate research traineeship in Materials Science and Engineering", \$555,000 (5 years, 7/93-6/98). PI: David B. Williams. Co-PIs - Katy Barmak, Helen M. Chan, Martin P. Harmer, and Arnold M. Marder.

1. Co-PI, Department of Energy (DoE), DE-93-01-SR010, "Functionally gradient materials for thermal barrier coatings in advanced gas turbine systems, \$750,000 (3 years, 9/93-8/96). PI: A. R. Marder. Other Co-PIs: Helen M. Chan, and Martin P. Harmer (Lehigh).

PATENTS, PROVISIONAL PATENTS and DISCLOSURES

4. **U.S. Patent 9,117,821** - Oriented Crystal Nanowire Interconnects

Inventors: Barmak, Katayun, Choi, Dooho, Coffey, Kevin R.

3. Thin-Film Media Structures for Perpendicular Magnetic Recording and Storage Devices Made Herewith

- U.S. Nonprovisional Application No. 14/346,247; Filed: 3/20/2014, U.S. National Phase of PCT/US2012/05671, CMU Ref. Nos. 2012-031 and 2012-12, Inventors: Granz, Steven D., Barmak, Katayun, Kryder, Mark H. (Response to final office action 3/26/2015)

2. Rare Earth-Free Permanent Magnetic Material based on FeNi

- International patent PCT/US2012/046935 filed on 7/16/2012. Inventors: Barmak, Katayun, Lewis, Laura.
- European patent filed on 3/17/2017.

1. **US Patent 6,846,734** - Method and process to make multiple-threshold metal gates CMOS technology

- Inventors: Amos, Ricky; Barmak, Katayun; Boyd, Diane C.; Cabral, Jr., Cyril; Leong, Meikei; Kanarsky, Thomas S.; Kedzierski, Jakub Tadeusz

BOOKS and BOOK CHAPTERS

5. Orientation Mapping, A. D. Rollett and K. Barmak, Chapter in Physical Metallurgy, eds. D. Laughlin, K. Hono, Elsevier, 2014. Print Book ISBN: 9780444537706, eBook ISBN: 9780444537713

5. Metallic Films for Electronic, Magnetic, Optical and Thermal Applications: Structure, Processing and Properties, eds. K. Barmak, K. R. Coffey, Woodhead Publishing Ltd. (now Elsevier), 2014.

ISBN 978-0-85709-057-7 (print)
ISBN 978-0-85709-629-6 (online)

- 3 Chapters by Barmak
 - Crystal Orientation Mapping in Scanning and Transmission Electron Microscopes
 - Post-Deposition Grain Growth in Metallic Films
 - Disorder-order Transformations in Metallic Films

4. Hollow-cone dark-field transmission electron microscopy for grain size and dislocation-density quantification of nanocrystalline materials, B. Yao, H. Heinrich, K. Barmak, K. R. Coffey, Kyu Cho, and Y.H. Sohn, in "Microscopy: Science, Technology, Applications and Education, A. Méndez-Vilas, and J. Díaz (Eds), , (Formatex Research Center, Badajoz, Spain, 2010). Vol. 2, pp. 1319-1326. ISBN (13): 978-84-614-6190-5

3. J. M. Rickman, K. Barmak, "Microstructural characterization associated with solid-solid transformations", Handbook of Materials Modeling, Springer, Netherlands, 2391-2402 (2005).

2. Magnetic Ultrathin Films, Multilayers and Surfaces - 1997, eds. J. Tobin, D. Chambliss, D. Kubinski, K. Barmak, P. Dederichs, W. de Jonge, T. Katayama, A. Schuhl, Materials Research Society Symposium Proceedings **475** (1997) pp. 1-622.

1. Polycrystalline Thin Films: Structure, Texture, Properties and Applications, eds. K. Barmak, M. A. Parker, J. A. Floro, R. Sinclair, D. A. Smith, Materials Research Society Symposium Proceedings **343** (1994) pp. 1-772.

PUBLICATIONS IN ARCHIVAL JOURNALS

Researcher ID: A-9804-2008
<http://orcid.org/0000-0003-0070-158X>
H-Index: 34 39 (Google)
i10 Index 117

164. A. P. Warren, X. Liu, V. Kamenini, K. R. Coffey, K. Barmak, M. F. Toney, Coherently Scattering Domain Size vs. Grain Size in Thin Metallic Films: A Comparative Study by X-ray Diffraction and Transmission Electron Microscopy, in preparation.

163. W. Cao, J. Liu, A. Zangiabadi, K. Barmak, W.E. Bailey, "Measurement of spin mixing conductance in Ni₈₁Fe₁₉/α-W and Ni₈₁Fe₁₉/β-W heterostructures via ferromagnetic resonance", J. Appl. Phys., submitted for publication.

162. Ouri Karni, Elyse Barré, Sze Cheung Lau, Roland Gillen, Eric Yue Ma, Bumho Kim, Kenji Watanabe, Takashi Taniguchi, Janina Maultzsch, Katayun Barmak, Ralph Page, and Tony F. Heinz, "Widely tunable infrared emission in MoS₂/WSe₂ heterostructures", submitted for publication.

161. Lorenz Maximilian Schneider, Shanece S. Esdaille, Daniel A. Rhodes, Katayun Barmak, James C. Hone, and Arash Rahimi-Iman, "Shedding light on the monolayer WSe₂ exciton's nature by optical effective mass measurements", submitted for publication.

160. D. Edelberg, D. Rhodes, A. Kerelsky, B. Kim, J. Wang, A. Zangiabadi, C. Kim, A. Abhinandan, J. Ardelean, M. Scully, D. Scullion, L. Embon, I. Zhang, R. Zu, E. Santos, C. Marianetti, K. Barmak, X.-Y. Zhu, J. Hone, A. N. Pasupathy, “Strongly Enhanced Light Emission via Defect Control in Monolayer Transition-Metal Dichalcogenides, submitted for publication.
159. Sameer S Ezzat, Prabhu Doss Mani, Asim Khaniya, William Kaden, Daniel Gall, Katayun Barmak, Kevin R. Coffey, “Resistivity and Surface Scattering of (0001) Single Crystal Ruthenium Thin Films”, *J. Vacuum Sci. Technol. A*, submitted for publication.
158. Erik Milosevic, Sit Kerdsonpanya, Mary E. McGahay, Amirali Zangiabadi, Katayun Barmak, Daniel Gall, “Resistivity scaling in epitaxial Co(0001) layers”, *J. Appl. Phys.*, submitted for publication.
157. (*Critical Review*) Emily Hsu, Katayun Barmak, Alan West, Ah-Hyung Park, “Advancements in the treatment and processing of electronic waste: a review of metal extraction and review technologies”, *Green Chemistry* **21**, 919 (2019).
DOI: 10.1039/c8gc03688h
156. Gabriel Martine La Boissonière, Rustum Choksi, Katayun Barmak, Selim Esedoglu, “Statistics of grain growth: experiment versus the phase-field-crystal and Mullins models”, *Materialia* **6**, 100280 (2019).
DOI: 10.1016/j.mtla.2019.100280
155. Yue Luo, Gabriella D. Shepard, Jenny V. Ardelean, Daniel A. Rhodes, Bumho Kim, Katayun Barmak, James C. Hone and Stefan Strauf, “Deterministic coupling of site-controlled quantum emitters in monolayer WSe₂ to plasmonic nanocavities”, *Nature Nanotechnology* **13**, 1137-1142 (2018).
DOI: 10.1038/s41565-018-0275-z
154. Erik Milosevic, Sit Kerdsonpanya, Amirali Zangiabadi, Katayun Barmak, Kevin R. Coffey, Daniel Gall, Resistivity size effect in epitaxial Ru(0001) layers, *J. Appl. Phys.* **124**, 165105 (2018).
DOI: 10.1063/1.5046430
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48. K. Barmak, D. Kinderlehrer, I. Livshits, and S. Ta'asan, "Remarks on a multiscale approach to grain growth in polycrystals", Proc. of Variational Problems in Materials Science, Trieste (2004).
47. M. Asheghi, Y. Yang, S. Sadeghipour, J. A. Bain, K. Barmak, M. S. Jhon, A. Gellman, E. Schlesinger, J. G. Zhu, and R. M. White, "Nanoscale energy transport in information technology research with an application to high-density data storage devices and systems", Proc. of IMECE Conference.
46. S. Zhang, Y. Yang, K. Barmak, Y. Rabin, Y. and M. Asheghi, "High Resolution Heat Nano-Calorimetry," ASME International Mechanical Engineering Congress & Exposition, IMECE 2004-62105, November 13-19, Anaheim, CA, (2004).
45. (*Invited*) K. Barmak, W. E. Archibald, A. D. Rollett, S. Ta'asan, D. Kinderlehrer, "Grain Boundary Properties and Grain Growth: Al Foils, Al Films", in Interfacial Engineering for Optimized Properties III, edited by Christopher A. Schuh, Mukul Kumar, C. Barry Carter and Valerie Randle (Mater. Res. Soc. Symp. Proc. Volume 819, Warrendale, PA, 2004), 819-N06-06, 1-12 (2004).
44. A. Gungor, K. Barmak, A. D. Rollett, C. Cabral, Jr., and J. M. E. Harper, "Texture of Cu and dilute binary Cu(Ti) and Cu(In) thin films", Materials Science Forum (Trans. Tech. Publications, Switzerland) **408-412**, 1567-1572 (2002).
43. (*Invited*) K. Barmak, A. Gungor, A. D. Rollett, C. Cabral, Jr., and J. M. E. Harper, "Texture and resistivity of Cu and dilute Cu alloy thin films", Mater. Res. Symp. Proc. **721**, 51-59 (2002).
42. A. Gungor, K. Barmak, A. D. Rollett, C. Cabral, Jr., and J. M. E. Harper, "Cu and dilute binary Cu(Ti), Cu(Sn) and Cu(Al) thin films: texture, grain growth and resistivity", Mater. Res. Symp. Proc. **721**, 60-65 (2002).
41. S. K. Lorachoroensery, W. Z. Misiolek, F. G. Hanejko, K. S. Narasimhan, and K. Barmak, "Magnetic coating on iron powder for improved magnetic performance", Proc. PM Conference, (2000).
40. K. Barmak, G. A. Lucadamo, C. Cabral, Jr., C. Lavoie, and J. M. E. Harper, "Classification of the modes of dissociation in immiscible Cu-alloy thin films", Mat. Res. Symp. Soc. Proc. **564**, 341-346 (1999).

39. J. Kim, K. Barmak, L. H. Lewis, D. C. Crew, and D. O. Welch, "Magnetic exchange coupling in CoPt/Co bilayer thin films", *Mater. Res. Symp. Soc. Proc.*, **577**, 353-358 (1999).
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37. G. Lucadamo, K. Barmak, D. T. Carpenter, C. Lavoie, C. Cabral, Jr., C. Michaelsen, and J. M. Rickman, "Microstructure evolution during solid-state reactions in polycrystalline Nb/Al and Ti/Al multilayer thin films", *Mater. Res. Symp. Soc. Proc.* **562**, 159-164 (1999).
36. D. T. Carpenter, M. Watanabe, D. B. Williams, K. Barmak, and David A. Smith, "Measurement of Cu distribution in an Al-4 wt.% Cu thin film by analytical electron microscopy," *Boundaries and Interfaces in Materials, Proceedings of The David A. Smith Symposium*, Edited by R. C. Pond, W. A. T. Clark, and A. H. King, TMS, 199-204 (1998)
35. D. F. Susan, K. Barmak, A. R. Marder, "Morphological development of electrodeposited Ni-Al particle composite coatings, advances in Coating Technologies of Surface Engineering, eds. C. R. Clayton, J. K. Hirvonen, and A. R. Srivatsa, (TMS, Warrendale, PA) 155-167 (1997).
34. R. A. Ristau, K. Barmak, K. R. Coffey, J. K. Howard, "L1₀ phase formation in CoPt thin films", *Mater. Res. Soc. Symp. Proc.* **475**, 119-124 (1997).
33. G. Lucadamo, M. Watanabe, K. Barmak, and D. B. Williams, "High resolution x-ray microanalysis of Nb/Al multilayer thin films", *Proc. Microscopy and Microanalysis* 967-968 (1997).
32. D. T. Carpenter, M. Watanabe, K Barmak, D. B. Williams, and D. A. Smith, "Quantification of Cu segregation to grain boundaries in an Al - 4 wt.% Cu thin film using high resolution x-ray mapping", *Proc. Microscopy and Microanalysis '97*, 537-538 (1997).
31. M. Watanabe, D. T. Carpenter, K. Barmak and D. B. Williams, "Quantitative x-ray mapping with high resolution", *Proc. European Microscopy Congress, Inst. of Phys. Conf. Series, Series 153, Section 8*, 295-298 (1997).
30. K. Barmak, S. W. Banovic, H. M. Chan, L. E. Friedersdorf, M. P. Harmer, A. R. Marder, C. M. Petronis, D. G. Puerta and D. F. Susan, "Processing and Properties of Electrodeposited Functionally Graded Composite Coatings of Ni-Al-Al₂O₃" , *Proc. of the 4th International Conference on Functionally Graded Materials, FGM '96, Oct. 21-24, Tsukuba, Japan, (Elsevier, Amsterdam 1997) pp. 227-232.*
29. K. Barmak, S. W. Banovic, H. M. Chan, L. E. Friedersdorf, M. P. Harmer, A. R. Marder, C. M. Petronis, D. G. Puerta and D. F. Susan, "Electrochemical processing of layered composited coatings of nickel-aluminum-alumina/alumina-zirconia", *Mater. Res. Soc. Symp. Proc.*, **451**, 469-474 (1997).

28. R.A. Ristau and K. Barmak, "Investigation of CoPt and CoPt + ZrO_x thin films for magnetic storage media using high-resolution analytical electron microscopy", Proc. Microscopy and Microanalysis, 1020-1021 (1996).
27. F. Ma, S. Vivekanand, K. Barmak and C. Michaelsen, "Transmission electron microscopy studies of solid state reactions in Nb/Al multilayer thin films", Proc. Microscopy and Microanalysis, 1020-1021 (1996).
26. G. Lucadamo, K. Barmak and C. Michaelsen, "Characterization of reactive phase formation in sputter-deposited Ni/Al multilayer thin films using transmission electron microscopy, Proc. Microscopy and Microanalysis, 1000-1001 (1996).
25. S. W. Banovic, C. M. Petronis, K. Barmak and A. R. Marder, "Graded Ni-alumina coatings via electrodeposition", Proc. of Symp. Elevated Temp. Coating: Science and Technol., Edited by N. B. Dahotre and J. M. Hampikian, TMS 89-98 (1996).
24. (*Invited*) K. Barmak, C. Michaelsen, J. Rickman, M. Dahms, "Reactive phase formation in thin films: evolution of grain structure", Mater. Res. Soc. Symp. Proc., **403**, 51-62 (1996)
23. R. Ristau, K. Barmak, D. Hess, K. R. Coffey, M. A. Parker and J. K. Howard, "Ordering and grain growth in CoPt thin films", Mat. Res. Soc. Symp. Proc. **398**, 557-562 (1996).
22. K. Barmak, S. Vivekanand, F. Ma, C. Michaelsen, "Nucleation and growth of the first phase in sputter-deposited Nb/Al multilayer thin films", Mater. Res. Soc. Symp. Proc. **398**, 257-262 (1996).
21. C. Michaelsen, S. Wöhlert, R. Bormann, K. Barmak, "The early stages of solid state reactions in Ti/Al multilayer films", Mater. Res. Soc. Symp. Proc., **398**, 245-250 (1996).
20. G. Lucadamo, K. Barmak, C. Michaelsen, "Amorphous and crystalline phase formation in Ni/Al multilayer thin films", Mater. Res. Soc. Symp. Proc. **398**, 227-232 (1996).
19. R. A. Ristau, K. Barmak, D. W. Hess, K. R. Coffey, J. K. Howard, "Grain growth kinetics in ordered Co-Pt thin films", Proc. of the 29th annual conf. of the Microbeam Analysis Soc., 415-416 (1995).
18. V. Saikumar, K. Barmak, C. Michaelsen, "A study of reactive phase formation in sputter-deposited Nb-Al multilayer thin films", Proc. of the 29th annual conf. of the Microbeam Analysis Soc., 413-414 (1995).
17. K. Barmak, C. Michaelsen, R. Bormann, G. Lucadamo, "Reactive phase formation in sputter-deposited Ni/Al thin films," Mater. Res. Soc. Symp. Proc. **382**, 33-38 (1995).
16. K. R. Coffey, K. Barmak, "A unified approach to grain boundary diffusion and nucleation in thin film reactions", Mater. Res. Soc. Symp. Proc. **343**, 193-204 (1994).

15. S. M. Lee, K. Barmak, "Amorphous/crystalline structure and phase transformation in metastable semiconducting $\text{Ge}_{1-x}\text{Sn}_x$ ", Mater. Res. Soc. Symp. Proc. **321**, 313-318 (1994).
14. K. Barmak, "The use of TEM and AEM in studying reactions and phase transformations in thin films", Proceedings of the **51st** Annual Meeting of the Microscopy Society of America, 842-843 (1993).
13. (*Invited*) L. A. Clevenger, Q. Z. Hong, R. Mann, J. M. E. Harper, K. Barmak, C. Cabral, Jr., C. Nobili and G. Ottaviani, "Silicide formation in Ti-Si and Co-Si reactions", Mater. Res. Soc. Symp. Proc. **311**, 253-264 (1993).
12. J. G. Holl-Pellerin, S. G. A. Anderson, P. S. Ho, K. R. Coffey, J. K. Howard, K. Barmak, "Grain boundary diffusion in Co/Cu and Co/Cr bilayer magnetic thin films", Mater. Res. Soc. Symp. Proc. **313**, 205-210 (1993).
11. K. Barmak, K. R. Coffey, "Grain boundary diffusion controlled precipitation as a model for thin film reactions", Mater. Res. Soc. Symp. Proc. **311**, 51-56(1993).
10. L. A. Clevenger, Q. Z. Hong, J. M. E. Harper, C. Cabral, Jr., R. Mann, C. Nobili, G. Ottaviani, K. Barmak, "Silicide formation and transformations in Ti-Si, Co-Si and Ni-Si Reactions, Mater. Res. Soc. Symp. Proc. **311**, 253-258 (1993).
9. E. Ganin, S. Wind, P. Ronsheim, A. Yapsir, K. Barmak, J. Bucchignano, R. Assenza, "TiSi₂ formation on submicron polysilicon lines: role of line width and dopant concentration", Mater. Res. Soc. Symp. Proc. **303**, 109-114 (1993).
8. Q. Z. Hong, K. Barmak, L. A. Clevenger, "Effects of ion implantation on crystallization of amorphous CoSi₂", Mat. Res. Soc. Symp. Proc. **279**, 541-546 (1993).
7. K. Barmak, L. E. Levine, D. A. Smith, Y. Komem, "In situ observation of C49 to C54 TiSi₂ transformation", Proceedings of the **50th** Annual Meeting of the Electron Microscopy Society of America, 1356-1357 (1992).
6. A. Mutscheller, L. A. Clevenger, J. M. E. Harper, C. Cabral Jr., K. Barmak, "Effect of deposition parameters on intrinsic stress, phase transformation and stress relaxation in thin Ta films, Mater. Res. Soc. Symp. Proc. **239**, 51-56 (1992).
5. K. Barmak, L. A. Clevenger, P. D. Agnello, E. Ganin, M. Copel, P. Dehaven, J. Falta, F. M. d'Heurle, C. Cabral Jr., "Effect of an interfacial Ti layer on the formation of CoSi₂ on Si", Mater. Res. Soc. Symp. Proc. **238**, 575-562 (1992).
DOI: <http://dx.doi.org/10.1557/PROC-238-575>
4. K. Barmak, K. R. Coffey, D. A. Rudman, S. Foner, "Effect of microstructure on phase formation in the reaction of Nb/Al multilayer thin films", Mater. Res. Soc. Symp. Proc. **230**, 61-66 (1992).

3. K. R. Coffey, K. Barmak, D. A. Rudman, S. Foner, "First phase formation kinetics in the reaction of Nb/Al, Mater. Res. Soc. Symp. Proc. **230**, 55-60 (1992).
2. K. Barmak, K. R. Coffey, D. A. Rudman, S. Foner, "Characterization of phase formation in multilayer thin films of Nb/Al by cross-sectional transmission electron microscopy", Materials Research Society, Selected Topics in Electronics Materials, 267 (1988).
1. G. Yurek, K. Przybylski, K. Barmak, S. N. Basu, "Oxidation behavior of fine-grained rapidly solidified alloys", Corrosion '88, Paper No. 132, NACE, (1988).

IBM PUBLICATIONS

9. K. Barmak, M. A. Lee, D. J. Schepis, K. Seshan, "An Instrument for Measurement of Pulsed Elements", IBM Technical Disclosure, rated publish.
8. Q. Z. Hong, K. Barmak, F. M. d'Heurle, "Formation of a C49 TiGe₂ phase during annealing a coevaporated Ti_{0.33}Ge_{0.67} alloy", IBM Res. Report RC 18997(82973), (1993).
7. L. A. Clevenger, Q. Z. Hong, R. Mann, J. M. E. Harper, K. Barmak, C. Cabral, Jr., C. Nobili, G. Ottaviani, "TiSi₂ and CoSi₂ reactions for CMOS Applications", IBM Res. Report RC 18915(82599), (1993).
6. L. A. Clevenger, Q. Z. Hong, R. Mann, J. M. E. Harper, K. Barmak, C. Cabral, Jr., C. Nobili, G. Ottaviani, "Silicide formation Ti-Si and Co-Si Reactions", IBM Res. Report RC 18861(82599), (1993).
5. K. Barmak, J. Gambino, "Separation of Gate Salicidation from Source/Drain Salicidation", IBM Technical Disclosure Bulletin **34**, 474 (1992).
4. Q. Z. Hong, K. Barmak, L. Clevenger, "Composition dependence of crystallization of Co-Si alloys", IBM Res. Report RC 17931(78809), (1992).
3. A. Mutscheller, L. A. Clevenger, J. M. E. Harper, C. Cabral, K. Barmak, "Effect of deposition conditions on intrinsic stress, phase transformation, and stress relaxation in tantalum thin films", IBM Research Report RC 17546(77456), (1992).
2. K. Barmak, "Improved Fuses for VLSI Circuits", IBM Technical Disclosure Bulletin **34**, 399 (1991).
1. K. Barmak, R. Bennett, S. Subbanna, A. Yapsir, "Double Poly Improved NTX Transistor Structure", IBM Technical Disclosure Bulletin **34**, 323 (1991).

INTERNAL SERVICE ACTIVITIES – COLUMBIA UNIVERSITY

University

- Presidential Teaching Awards (2012), member
- Presidential Teaching Awards (2013), member
- Presidential Teaching Awards (2014), chair

College - SEAS

- Undergraduate Curriculum Committee (2014-)
- Task Force on the Masters Program (2013-2014)
- Dean Search Committee (2012-2013)
- Tenure Workshop (January 25, 2012) – Participant giving advice to junior faculty
- SEAS Days on Campus, Master Class (April 19, 2013)
Lessons from Materials Science and Engineering: The Electrical Resistivity of Nanometric Cu Films

Department

- APAM Research Conference (Fall 2011)
- Chair, Faculty Search Committee (2011-2012)

INTERNAL SERVICE ACTIVITIES - CARNEGIE MELLON

University

- None

College - CIT

- CIT Ad Hoc Promotion and Tenure Committee (2007)
- CIT Ad Hoc Promotion and Tenure Committee (2005)
- Department Head Search Committee, Mechanical Engineering (2005)
- Department Head Search Committee, Materials Science and Engineering (2005)
- Sigma Xi undergraduate research competition, Judge (2005)
- CIT Ad Hoc Promotion and Tenure Committee (2004)
- “Meeting of the Minds”, Judge (2002)
- CIT Awards Committee (2001)
- Department Head Search Committee, MSE (2000)
- “Meeting of the Minds”, Judge (2000)
- “Meeting of the Minds”, Judge (1999)

Department

- Faculty Advisor, ASM Material Advantage Student Committee (2009-2011)
- Chair, Graduate Recruitment Committee (2006-2011)
- Chair, Departmental Seminar Committee (2006-2009)
- Undergraduate Curriculum Committee (2004-2011)
- Facilities Committee (2005-2006)
- Undergraduate Program Assessment and Review Committee (ABET) (2004-2005)
- GSAC Advisor (2003-2005)
- SAC Advisor (2000-2003)
- Undergraduate Affairs Committee (2001-2005)

- Graduate Affairs Committee (2001-2005)

Other

- Director of Outreach Activities, Mesoscale Interface Mapping Project (MIMP), Materials Research Science and Engineering Center (MRSEC), Carnegie Mellon University (2000)

INTERNAL SERVICE ACTIVITIES - LEHIGH

University

- Provost's Council (1998)
- Provost Search Committee (1996-97)
- Dean's Search Committee, Engineering and Applied Science (1994-95)
- Lehigh University Prestige Scholarship Committee (1992-1996)

College

- Engineering College Student Retention Committee

Department

- Search Committee, Loewy Chair, Department of Materials Science and Engineering (1996)
- Directed a \$250,000 renovation effort for thin film processing, ceramic processing (clean room), thin film characterization and electrochemical processing laboratories (1993-95)
- Faculty Co-advisor of the Departmental Student Materials Society (1995-1998)
- Sigma Xi, Departmental officer

EXTERNAL ACTIVITIES

39. Member of Editorial Board of Journal Magnetism and Magnetic Materials,
38. Meeting Co-Chair, 13th Joint Magnetism and Magnetic Materials and Intermag Conference 2016.
37. Judge, Tricounty Science Fair, April 2014.
36. Program Committee Member, Magnetism and Magnetic Materials Conference 2014 (July 2014).
35. Panel member, NSF SBIR/STTR grants, February 2014.
34. Program Committee Member, Magnetism and Magnetic Materials Conference 2013 (July 2013).
33. IEEE Magnetics Conference Executive Committee, (2013-present).
32. Program Committee Member, Magnetism and Magnetic Materials Conference 2011.

31. Member, IEEE Magnetics Society and the society representative to Women in Engineering (WIE) Committee. The latter is a committee of the IEEE Board of Directors (2011-2013).
30. Session Chair, Magnetism and Magnetic Materials Conference, November 2010.
29. International Materials Reviews Committee (2010-2013)
28. Panel member, NSF CAREER grants, October 2009.
27. Associate Editor, Journal of Electronic Materials (2007-2013).
26. Program Committee Member, Magnetism and Magnetic Materials Conference 2008 (July 2008).
28. Congressional Visit Day – Visiting the Staff of the Offices of Members of the House of Representatives and the Senate”, March 4, 5, 2008.
27. Chair, MO Physics and Devices II, MORIS, Pittsburgh, PA (2007).
26. Program Committee Member, Magnetism and Magnetic Materials Conference 2007 (July 2007).
25. Panel Member, Pre-proposals for Integrated Graduate Education and Research Program, NSF, June 2007.
24. Program Committee Member, 10th Joint Magnetism and Magnetic Materials and Intermag Conference 2007 (August 2006).
23. Member, Graduate Student Award Subcommittee of the Awards Committee, Materials Research Society, 2003-2005.
22. Program Committee Member, 50th Annual Conference on Magnetism and Magnetic Materials 2005.
21. Judge, Graduate Student Award, Materials Research Society, April 2004.
20. Panel Member, NSF-EU grants, January 2004.
19. Panel member, NSF CAREER grants, October 2002.
18. Member, Nominations Committee, Materials Research Society, 2001.
17. Site Review Panel Member, Harvard University National Science Foundation Materials Research Science and Engineering Center (NSF MRSEC), Spring 2001.
16. Meeting Chair, Materials Research Society, Spring 1999.

15. Elected Member of Board of Directors (i.e., Council), Materials Research Society, (1998-2000).
14. Member, Student Affairs Committee, The Minerals, Metals, Materials Society (1998-2000).
13. Judge, Graduate Student Award, Materials Research Society, December 1997.
12. Reviewer, NSF CAREER grants, October 1997.
11. Symposium Organizer, Materials Research Society Symposium M - "Magnetic Ultrathin Films, Multilayers and Surfaces", April 1997.
10. Panel member, NSF instrumentation grants, January 1997.
9. Panel member, NSF CAREER grants, January 1997.
8. Chair, Membership Committee, Materials Research Society (1996-1998).
7. Committee of Visitors, National Science Foundation (NSF), April 1996.
6. Panel member, NSF instrumentation grants, January 1995.
5. Chair, Promotion and Retention Subcommittee of the Membership Committee, Materials Research Society (1994-95).
4. Symposium Organizer, Materials Research Society Symposium H - "Polycrystalline Thin Films: Structure, Texture, Properties and Applications", April 1994.
3. International Advisory Committee member for Functionally Graded Materials (1994-1999)
2. Judge, Lehigh Valley Science and Engineering Fair, March 1994.
1. Reviewer for:
 NSF, DoE, CRDF, J. Magn. Mag. Mater., Metall. Transactions, Applied Physics Letter, Thin Solid Films, J. Mater. Sci. Mater. Res. Bulletin, J. Vac. Sci. Technol, J. Physics, Mater. Sci. Eng., J. Electrochemical Soc.

INVITED TALKS, PROJECT REVIEW PRESENTATIONS (Partial)

92. "Synthesis and Characterization of Transition Metal Dichalcogenide: GrapheneUS Conf., City University of New York, New York, NY, March 2019.
91. "Cu and Interconnects Beyond Cu", University of Connecticut, Storrs, CT, February 2019.

90. WoPhyS '18, Annual Conference for Undergraduate Women in Physical Sciences, University of Nebraska, Lincoln, NE, October 2018.
89. "Grain Structure, Grain Boundary Character Distribution and Grain Growth in Thin Metallic Films", SIAM Conference, Portland, OR, July 2018.
88. "Grain Structure, Grain Boundary Character Distribution and Grain Growth in Thin Metallic Films", University of Utah Math Dept., Salt Lake City, UT, April 2018.
87. "Interconnects Beyond Cu", University of Michigan, Ann Arbor, MI, November 2017.
86. "Transmission Electron Microscopy (TEM): A Few Examples of Materials Studies", Lamont Doherty Earth Observatory, November 2017.
85. "Cu and Interconnects Beyond Cu", Advanced Metallization Conference, Austin, TX, October 2017.
84. "Puzzle of Grain Growth Stagnation in Metallic Films: Simulations and Experiments", Topics in Applied Non-linear Analysis: Recent Advances and New Trends, Conference in Honor of David Kinderlehrer's 75th Birthday, Pittsburgh, PA, July 2016.
83. "Grain Growth in Metallic Films: Simulations and Experiments", SIAM Conference, Philadelphia, PA, May 2016.
82. "Grain Boundary and Surface Scattering of Electrons in Metals for Deeply-Scaled Interconnects", University of Southern Florida, April 2016.
81. "Grain Growth and the Puzzle of its Stagnation in Metallic Films: Experiment, Simulation and Analytic Theory", TMS Conference, Orlando, FL, March 15-19, 2015.
80. "Grain Growth and Grain Growth Stagnation in Metallic Films: The Curious Tail of a Tale and an Ear", The Courant Institute, New York University, November 2014.
79. (*Plenary Lecture*) "Grain Growth and Grain Growth Stagnation in Thin Films: The Curious Tale of a Tail and an Ear", Continuum Models Discrete Systems, University of Utah, Salt Lake City, UT, July 21-25, 2014.
78. "Grain Boundary and Surface Scattering in Interconnect Metals", Rensselaer Polytechnic Institute, February 2014.
77. "Grain Boundary and Surface Scattering in Interconnect Metals", IBM, Albany, October 2013.
76. "Impact of Grain Boundary and Surface Scattering on Resistivity", Advanced Metallization Conference 2013, College of Nanoscale Science and Engineering, SUNY, Albany, October 2013.

75. (*Plenary Lecture*) “The A1 to L1₀ Transformation in FePt, FeNi and Related Alloys”, International Symposia on Metastable Amorphous and Nanocrystalline Materials (ISMANAM), Turin, Italy, July 2013.
74. L1₀ FePt: Ordering, Anisotropy Constant and their relation to Film Composition, 12th joint InterMag and Magnetism and Magnetic Material Meeting, Chicago, Illinois, January 2013.
73. “Grain Growth and the Puzzle of its Stagnation in Thin Films: Comparison of Experiments and Simulations”, Institute for Pure and Applied Mathematics, University of California, Los Angeles, November 2012.
72. “Surface and Grain Boundary Scattering in Nanometric Cu Films: A Quantitative Analysis Including Twin Boundaries”, Case Western Reserve University, Cleveland, OH, November 2011.
71. “Surface and Grain Boundary Scattering in Nanometric Cu Films: A Quantitative Analysis Including Twin Boundaries”, Rutgers University, New Brunswick, NJ, November 2011.
70. “Surface and Grain Boundary Scattering in Nanometric Cu Films: A Quantitative Analysis Including Twin Boundaries”, EFRC presentation, Columbia University, NY, November 2011.
70. “Mapping Nanoscale Structures”, Dean’s Advisory Council, Carnegie Institute of Technology, Carnegie Mellon University, Pittsburgh, PA, April 2011.
69. Quantitative Kinetic Models and Experiments of L1₀ Formation in FePt, CoPt and Related Alloy Films”, Information Storage Industry Consortium Meeting, Santa Clara, CA, January 2011.
68. “Classical Resistivity Size Effect: Surface and Grain Boundary Scattering in Cu Thin Films and Lines”, Mesoscale Interface Mapping Project Seminar, Pittsburgh, PA, December 2010.
67. Quantitative Kinetic Models and Experiments of L1₀ Formation in FePt, CoPt and Related Alloy Films”, Information Storage Industry Consortium Meeting, Milpitas, CA, August 2010.
66. (*Outreach*) Research Experience for Undergraduate Summer Professional Development Series,
65. “Orientation Mapping in the Transmission Electron Microscope”, Mesoscale Interface Mapping Project Summer School, Pittsburgh, PA June 2010.
64. Quantitative Kinetic Models and Experiments of L1₀ Formation in FePt, CoPt and Related Alloy Films”, Pittsburgh, PA, May 2010.
63. “Thermodynamics and Kinetics of L1₀ Phase Formation in FePt and Related Ternary Alloys”, IFW Dresden, Germany, April 2010.
62. “Experimental Studies on Interfacial and Grain Boundary Scattering in Cu, 11th International Workshop on Stress Induced Phenomena in Metallization”, Bad Schandau, Germany, April 2010.

61. "Quantitative Kinetic Models and Experiments of L1₀ Formation in FePt, CoPt and Related Alloy Films", Information Storage Industry Consortium Meeting, Berkeley, CA, January 2010.
60. "Heat-Assisted Magnetic Recording: The Kinetics and Thermodynamics of L1₀ Formation in FePt and Related Ternary Alloys", David Laughlin Symposium, MS&T Conference, Pittsburgh, October 2009.
59. "Grains, Grain Growth and the Impact of Grain Boundaries on Electrical Resistivity", Columbia University, June 2009.
58. "Lessons from Materials Science: Dominant role of Grain Boundary Scattering in the Resistivity of Encapsulated Cu Films", Physics Colloquium, Carnegie Mellon University, May 2009.
57. "L1₀ Alloys for HAMR Media: On the Nucleation of the L1₀ phase", Seagate Research, April 2008.
56. "Grain Growth and the Puzzle of its Stagnation in Thin Films: The Tale of a Tail and an Ear?", California Institute of Technology, March 2008.
55. "L1₀ Ordered Intermetallics for Ultrahigh Density Magnetic Recording Media: Phase Formation and the Role of Alloy Chemistry and Composition", Materials Research Society Conference, Boston November 2006.
54. "Resistivity of Sub-45 nm Cu Interconnects: Processing, Transport, and Microstructural Characterization – 1292.008", SRC CAIST Back End Workshop, SUNY, Albany, May 2006.
53. "The A1 to L1₀ transformation in FePt, FeCuPt and FeNiPt", Seagate Research, April 2006.
52. "An Old Problem, A New Approach: Grain Boundary Properties and Grain Growth", University of Central Florida, Orlando, May 2005.
51. "An Old Problem, A New Approach: Grain Boundary Properties and Grain Growth", Boston University, Boston, March 2005.
50. "Microstructural design of polycrystalline materials: nucleation and growth, grain growth" Plasticity Conference, Kauai, January 2005.
49. "Grain boundary properties and grain growth: Al Foils, Al Films", Materials Research Society Conference, San Francisco, April 2004.
48. "Calorimetric studies of the A1 to L1₀ transformation in FePt and related ternary alloys", Seagate Research, November 2003.
47. "Calorimetric studies of the A1 to L1₀ phase transformation in FePt and CoPt", Seagate

Research, July 2003.

46. "Cu and Cu-alloy thin films: resistivity, texture and grain structure", Interconnect Technology Seminar, IBM T. J. Watson Research Center, July 2003.

45. "Cu and Cu-alloy thin films", IBM T. J. Watson Research Center, April 2003.

44. "Cu and Cu-alloy thin films: resistivity, texture and grain structure", Materials Research Society Conference, San Francisco, April 2003.

43. "Differential scanning calorimetry: thin film reactions and phase transformations", IBM T. J. Watson Research Center, September 2002.

42. "Texture and resistivity of Cu and dilute Cu alloy thin films", Materials Research Society Conference, San Francisco, April 2002.

41. "Differential scanning calorimetry", Seagate, Minneapolis, February 2002.

40. "Phase transformations in polycrystalline thin films: experiment, theory and simulation", Columbia University, March 2001.

39. "Ordering and grain growth in CoPt and FePt thin films", IBM Almaden Research Center, February 2001.

38. "Magnetic Signature of compositional gradient in exchange spring bilayer thin films of CoPt/Co", Brookhaven National Laboratory, January 2001.

37. "High anisotropy constant materials for magnetic recording media: $L1_0$ ordering and grain growth in CoPt and FePt thin films", Data Storage Systems Center, Carnegie Mellon University, September 2000.

36. "Dissociation of dilute copper alloys", IBM T. J. Watson Research Center, August 2000.

35. "Grain growth and ordering in CoPt and FePt thin films", Seagate Technology Lab, Pittsburgh, July 2000.

34. "Experimental and theoretical studies of thin film reactions", Indiana University of Pennsylvania, February 2000.

33. "Thin film reactions", Department of Chemical Engineering, Carnegie Mellon University, October 1999.

32. "Phase Transformations in Thin Metal Films", Naval Research Laboratory, Washington, DC, October 1999.

31. "Phase transformations and mechanical behavior of metal thin films and multilayers",

University of Pittsburgh, Department of Mechanical Engineering, October 1999.

30. "Semiconductor Metallization: Phase Transformations in Thin Films", University of Pittsburgh, Department of Materials Science and Engineering, September 1999.

29. "Thin films", Seminar Series, Carnegie Mellon University, September 1999.

28. "Nucleation and growth in thin film reactions: microstructural implications", Rensselaer Polytechnic Institute, March 1999.

27. "Grain structure evolution in thin film reactions", Case Western Reserve University, April 1998.

26. "Evolution of grain structure in thin film reactions", Carnegie Mellon University, March 1998.

25. "Contact metallization and the solid state reaction of thin films", Princeton University, January 1998.

24. "Evolution of grain structure in thin film reactions", Penn State, October 1997.

23. "Role of grain boundaries and interfaces in thin film reactions", Boundaries and Interfaces in Materials: The David A. Smith Memorial Symposium, TMS/ASM Meeting, Indianapolis, IN, Sept. 15,-18, 1997.

22. "Ultrasonic characterization of particles in electrochemical deposition baths," presented at the work shop on Ultrasonic and Dielectric Characterization Techniques for Suspended Particulates, NIST, Gaithersburg, MD, August 4-6, 1997.

21. "Role of interfaces and grain boundaries in thin film reactions", SUNY, Albany, NY, March 1997.

20. "Evolution of grain structure in thin film reactions", Johns Hopkins University, Baltimore, MD, March 1997.

19. "Evolution of grain structure in thin film reactions", II. Fabrication of thermal barrier coatings by electrochemical methods", SUNY, Stony Brook, NY, March 1997.

18. "Evolution of grain structure in thin film reactions, TMS conference, Orlando, Florida, Feb. 10-14, 1996.

17. "Reactive phase formation in thin films: evolution of grain structure," Cambridge University, England, June 1996.

16. "Reactive phase formation in thin films: evolution of grain structure," University of Manchester, England, June 1996.

15. "Reactive phase formation in thin films: evolution of grain structure," Department of Mechanical, Industrial and Manufacturing Engineering, Northeastern University, Boston, MA, May, 1996.
14. "Electrodeposited functionally graded composite coatings", Microscopy of Composite Materials III, Organized by the Royal Microscopical Society, Oxford, England, April 1996.
13. "Tailoring of silicides and aluminides for metallization in microelectronics, ISHM local meeting, Lehigh University, February 1996.
12. "Reactive phase formation in thin films: evolution of grain structure", Fall meeting of the Materials Research Society, Boston, MA, December, 1995.
11. "Metal films and coatings", Sigma Xi luncheon meeting, Lehigh University, November 1994.
10. "Reactive phase formation at interfaces", Department of Chemistry, Lehigh University, November, 1994.
9. "Metal films and coating", Department of Chemistry, Lehigh University, June, 1994.
8. "Solid-state reactions in thin films", Johns Hopkins University, October 1994.
7. "Reactive phase formation at interfaces", University of Konstanz, Germany, August 1994
6. "Reactive phase formation at interfaces", GKSS Research Center, Geesthacht, Germany July, 1994.
5. "Metal films and coatings", Lawrence University, Wisconsin, February 1994.
4. "The use of transmission and analytical electron microscopy in studying reactions and phase transformations in thin films", Microscopy Society of America, August 1993.
3. "Role of grain boundary diffusion in thin film reactions", AT&T, December 1992.
2. "Phase formation in the reaction of multilayer thin films of Nb/Al", Stevens Institute of Technology, Department of Materials Science and Engineering, February 1991.
1. "Phase formation in the reaction of Nb/Al multilayers: a new theory of thin film reaction kinetics", Brookhaven National Laboratory, April 1991.

PARTIAL LIST OF CONFERENCES ATTENDED

72. SIAM Conference, Portland, OR, July 2018.
71. Advanced Metallization Conference, Austin, TX, October 2017.

70. SIAM Conference, Philadelphia, PA, May 2016.
69. Microscopy and Microanalysis Meeting, Portland, OR, August 2015.
68. TMS Conference, Orlando, FL, March, 2015
67. American Vacuum Society Conference, Baltimore, MD, November 2014.
66. Magnetism and Magnetic Materials, Denver, CO, November 2013.
65. Advanced Metallization Conference, College of Nanoscale Science and Engineering, October 2013.
64. Microscopy and Microanalysis Meeting, Indianapolis, IN, August 2013.
63. International Symposia on Metastable Amorphous and Nanocrystalline Materials (ISMANAM), Turin, Italy, July 2013.
62. Materials Research Society Meeting, San Francisco, April 2013.
61. Magnetism and Magnetic Materials/Intermag, Chicago, IL, January 2013.
60. IPAM, UCLA, CA, November 2012.
59. Magnetism and Magnetic Materials, Scottsdale, AZ, October 2011.
58. Advanced Storage Technology Consortium Meeting, Santa Clara, CA, January 2011.
57. Magnetism and Magnetic Materials, Atlanta, GA, November 2010.
56. MS&T, Houston, TX, October 2010.
55. Information Storage Industry Consortium Meeting, Milpitas, CA, August 2010.
54. Microscopy and Microanalysis Meeting, Portland, OR, August 2010.
53. Recrystallization and Grain Growth Conference, Sheffield, UK, July 2010.
55. Information Storage Industry Consortium Meeting, Pittsburgh, PA, May 2010.
52. 11th International Workshop on Stress Induced Phenomena in Metallization, Bad Schandau, Germany, April 2010.
55. Information Storage Industry Consortium Meeting, Berkeley, CA, January 2010.

51. MS&T, Pittsburgh, PA, October 2009.
50. Microscopy and Microanalysis, Richmond, VA, August 2009.
49. Materials Research Society Meeting, San Francisco, April 2009.
48. Magnetism and Magnetic Materials, Austin, TX, November 2008.
47. MS&T, Pittsburgh, PA, October 2008.
47. International Conference on the Texture of Metals, ICOTOM 15, Pittsburgh, PA, June 2008.
46. Magnetism and Magnetic Materials, Tampa, FL, November 2007.
45. MORIS conference, Pittsburgh, PA, September 2007.
44. The 10th joint Intermag/MMM conference, Baltimore, MD, January 2007.
43. Materials Research Society Meeting, Boston, November 2006.
42. Semiconductor Research Corporation Back End Processing Workshop, SUNY Albany, NY, May 2006.
41. Magnetism and Magnetic Materials, San Jose, CA, October 2005.
40. MS&T, Pittsburgh, September 2005.
39. International Conference on the Texture of Metals, ICOTOM 14, Leuven, Belgium, July 2005.
38. Cu Resistivity Workshop, San Jose, CA, June 2005.
37. TMS, 134th Annual Meeting and Exhibition, San Francisco, CA, February 2005.
36. Plasticity Conference, Kauai, HI, January 2004.
35. L1₀ Ordered Intermetallic and Related Phases for Permanent Magnet and Recording Applications, Copper Mountain, CO, August 2004.
34. Materials Research Society, San Francisco, CA, April 2004.
33. The 9th joint Intermag/MMM conference, Anaheim, CA, January 2004.
32. Materials Research Society, San Francisco, CA, April 2003.
31. Intermag 2002, Amsterdam, April-May 2002.

30. Materials Research Society, San Francisco, CA, March-April 2002.
29. Materials Research Society, San Francisco, CA, April 2001.
28. The 8th joint InterMag/MMM conference, San Antonio, TX, January 2001.
27. Materials Research Society, San Francisco, CA, April 2000.
26. Materials Research Society, Boston, MA, November -December, 1999.
25. Materials Research Society, San Francisco, CA, April, 1999.
24. Materials Research Society, San Francisco, CA, April, 1998.
23. Materials Research Society, Boston, MA, December, 1997.
22. The Minerals, Metals, Materials Society, Orlando, Indianapolis, September, 1997.
21. Workshop on Ultrasonic and Dielectric Characterization Techniques for Suspended Particulates, NIST, Gaithersburg, MD, August 4-6, 1997.
20. The Minerals Metals Materials Society, Orlando, Florida, February, 1997.
19. Materials Research Society, Boston, MA, December, 1996.
18. Fourth International Symposium on Functionally Graded Materials, Tsukuba, Japan, October, 1996.
17. Microscopy and Microanalysis 1996, Minneapolis, MN, August, 1996.
16. The 11th International Congress on Thermal Analysis and Calorimetry, Philadelphia, PA, August, 1996.
15. Materials Research Society, San Francisco, CA, April, 1996.
14. The Microscopy of Composites III, Oxford, England, April, 1996.
13. Materials Research Society, Boston, MA, December, 1995.
12. Magnetism and Magnetic Materials, Philadelphia, PA, November, 1995.
11. The Young Investigator meeting, White Oaks, CA, October, 1995.
10. NIST workshop on nanoscale structural materials, Gaithersburg, August 1995.
9. Microbeam Analysis Society 1995, Breckenridge, CO, August, 1995.

8. Ceramic Society Meeting, Cincinnati, OH, April, 1995.
7. Materials Research Society, San Francisco, CA, April 1995.
6. Functionally Gradient Materials III, Lausanne, Switzerland, October, 1994.
5. Materials Research Society, San Francisco, CA, October 1994.
4. International Symposium on Mechanisms of Formation of Metastable Microstructures, Cambridge, U.K., July, 1993.
3. Materials Research Society, San Francisco, CA, April, 1993.
2. The Metals, Materials, Minerals Society Meeting, October, 1992.
1. Microscopy Society of America, Boston MA, August, 1992.

CONFERENCE PRESENTATIONS (without an accompanying proceedings' paper)

25. A. P. Warren, B. Yao, T. Sun, K. Barmak, M. F. Toney³, and K. R. Coffey, "X-ray Scattering Study of Interface Evolution and Grain Growth in Encapsulated Cu Films" Materials Research Society Spring Meeting, San Francisco, April 2009.
24. T. Sun, B. Yao, A. P. Warren, D. Choi, K. Barmak, M. F. Toney, R. E. Peale, and K. R. Coffey, "Dominant Role of Grain Boundary Scattering in the Resistivity of Encapsulated Cu Films", Materials Research Society Spring Meeting, San Francisco, April 2009.
23. K. Barmak, A. Darbal, T. Nuhfer, D. J. Dingley, G. Meaden, J. Michael, T. Sun, K. R. Coffey, "Orientation Imaging of Nanocrystalline Copper and Platinum Films in the Transmission Electron Microscope", Materials Research Society Spring Meeting, San Francisco, April 2009.
22. A.D. Rollett, K. Barmak, and B. Radhakrishnan, "Simulation of Interconnect Microstructures", Materials Research Society Spring Meeting, San Francisco, April 2009.
21. K. Barmak, D. C. Berry, J. M. Rickman, "L1₀ Alloys for Heat Assisted Magnetic Recording (HAMR) Media: On the Nucleation of the L1₀ Phase in FePt and FeCuPt Alloy Films", Magnetism and Magnetic Materials Conference, Austin, TX, November 2008.
20. K. Barmak, D. C. Berry, B. Wang, "Determination of the Long Range Order Parameter in Fiber-Textured Films of L1₀ FePt", International Conference on the Texture of Metals, ICOTOM 15, Pittsburgh, PA, June 2008.

19. D. C. Berry, B. Wang, K. Barmak, T. J. Klemmer, "L₁₀ FePt for Ultrahigh Density Magnetic Recording Media: Heats of Formation of the Ordered Intermetallics in the Fe-Pt System", Magnetism and Magnetic Materials, Tampa, FL, November 2007.
18. Heat Assisted Magnetic Recording Media: L₁₀ FePt and the Impact of Ternary Additions of Cu and Ni on the Curie Temperature and the Ordering Transformation", MORIS conference, Pittsburgh, PA, September 2007.
17. K. Barmak, J. Kim, C.-S. Kim, W. E. Archibald, G. Rohrer, A. D. Rollett, S. Ta'asan, D. Kinderlehrer, H. Zhang, D. J. Srolovitz, "Grain boundary energy and grain growth in <111> fiber-textured Al films", MS&T, Pittsburgh, September 2005.
16. K. Barmak, J. Kim, C.-S. Kim, G. S. Rohrer, H. Zhang, D. Srolovitz, "Grain boundary energy as a function of misorientation in <111> fiber-textured Al films: Experiment and simulation", TMS, San Francisco, February 14-18, 2005.
15. K. Barmak, W. E. Archibald, A. D. Rollett, S. Ta'asan, D. Kinderlehrer, "Microstructural design of polycrystalline materials: nucleation and growth, grain growth", Plasticity 2005, Kauai, HI, January 2005.
14. K. Barmak, "Calorimetric studies of the Al to L₁₀ phase transformation in binary FePt and ternary FeCuPt and FeNiPt thin films", L₁₀ Ordered Intermetallic and Related Phases for Permanent Magnet and Recording Applications, Copper Mountain, CO, August 2004.
13. K. Barmak, J. Kim, D. C. Berry, K. W. Wierman, E. B. Svedberg and J. K. Howard, "Calorimetric Studies of the Al to L₁₀ Transformation in FePt and Related Ternary Alloy Thin Films", The 9th joint Intermag/MMM conference, Anaheim, CA, January 2004.
12. K. Barmak, J. Kim, L. H. Lewis, K. R. Coffey, M. F. Toney, A. J. Kellock and J.-U. Thiele "Stoichiometry – Anisotropy Connections in Epitaxial L₁₀ FePt(001) Films", The 9th joint Intermag/MMM conference, Anaheim, CA, January 2004.
11. K. Barmak, "Reactive phase formation in thin films: evolution of grain structure", DIFTRANS '98, Cherkasy, Ukraine.
10. C. Michaelsen, G. Lucadamo, K. Barmak, "Sequence of phase formation in the reaction of Ni/Al multilayer thin films", presented at the Materials Research Society Meeting, , Boston, MA, December 1-5,1997.
9. G. Lucadamo, K. Barmak, C. Michaelsen, J. Rickman, S. Tong, J. Codner, "Reactive phase formation and product grain size in Nb/Al multilayer thin films", presented at the Materials Research Society Meeting, Boston, MA, December 1-5, 1997.
8. K. Barmak, "Role of grain boundaries and interfaces in thin film reactions", Boundaries and Interfaces in Materials: The David A. Smith Memorial Symposium, TMS/ASM Meeting, Indianapolis, IN, Sept. 15-18, 1997.

7. K. Barmak, "Ultrasonic characterization of particles in electrochemical deposition baths," presented at the work shop on Ultrasonic and Dielectric Characterization Techniques for Suspended Particulates, NIST, Gaithersburg, MD, August 4-6, 1997.
6. K. Barmak, S. Banovic, H. M. Chan, L. Friedersdorf, M. P. Harmer, A. M. Marder, C. M. Petronis, D. Puerta, D. Susan, "Functionally graded electrodeposited thermal barrier coatings", The Metals, Materials, Minerals Meeting, Orlando, FL, Feb. 10-14, 1997.
5. G. Lucadamo, K. Barmak, C. Michaelsen, "Intermetallic Phase Formation in Nanoscale Ni/Al Multilayers, NIST workshop on nanoscale structural materials, Gaithersburg, MD. August 1995.
4. K. Barmak, C. Petronis, S. Banovic, A. R. Marder, "Fabrication of Functionally Graded Metal-Ceramic Coatings by electrodeposition", American Ceramic Society, Cincinnati, OH, April 1995.
3. K. Barmak, "Mechanisms of grain structure development in the reaction of polycrystalline thin films", presented at the International Symposium on Mechanisms of Formation of Metastable Microstructures, Cambridge, U.K., July 1993.
2. K. Barmak, K. R. Coffey, D. A. Rudman, and S. Foner, "Characterization of intermetallic phase formation in multilayer thin films of Nb/Al by cross-sectional transmission electron microscopy", presented at the Annual Meeting of The Metallurgical Society, Las Vegas, NV, February 1989.
1. K. R. Coffey, K. Barmak, D. A. Rudman, and S. Foner, "Investigation of Nb/Al Diffusion Reactions by Scanning Calorimetry in Thin Film and Powder Metallurgy Processed Samples", presented at the Annual Meeting of The Metallurgical Society, Las Vegas, NV, February 1989.