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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

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

HONORS AND AWARDS

2010-2013 International Materials Review Committee Member

2009 Philbrook Prize in Engineering awarded for substantial, sustained
contributions to excellence in education, or to the application of materials
science to important problems, Department of Materials Science and
Engineering, Carnegie Mellon University

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 Science and Engineering, Lehigh University
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

TEACHING EXPERIENCE

Columbia University

MSAE-4100 (<i>New</i>)	Crystallography (F13, F14)
MSAE-4101	Structural Analysis of Materials (F13, F14)
MSAE-4215	Mechanical Behavior of Materials (S13, S14)

Carnegie Mellon University

Undergraduate Courses

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

27-530 (*New*) S07)
Advanced Physical Metallurgy (S00)

Graduate Courses

27-780 (*New*) Thermodynamics (F08)
27-799 (*New*) Thermodynamics II (F09, F10)
39-610 (*New*) Energy Conversion and Supply (F10)

Non-FCE Courses

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

Lehigh University

Undergraduate Courses

MAT33 Engineering Materials and Processes (S94, S95, S97, F97x2, S98)
MAT216 Diffusion and Phase Transformations (F96, F97)
MAT312, ChE312, CHM312(*New*) Fundamentals of Corrosion (S93, S95, S97)
MAT367, ChE367 (*New*) Metal Films and Coatings: Processing, Structure, Properties (Co-taught with Chemical Eng.) (S94)

Graduate Courses

MAT401 (*New*) Thermodynamics and Kinetics I (F93, F94, F95)
MAT412 (*New*) Magnetic Properties of Materials (F93)

Laboratories

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

Short Courses and Other

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

For courses marked as "New", I developed notes, problem sets, examinations and team projects depending on the content of the course.

RESEARCH INTERESTS

Processing, properties, crystal structure, grain structure, and texture of polycrystalline metal films for application in engineered systems such as integrated circuits and magnetic recording

media; thermodynamics and kinetics of reactions and phase transformations in nanostructured films; experimental, analytical and simulational studies of transformations and associated microstructures in thin films; and properties of grain boundaries. Characterization techniques of interest include differential scanning calorimetry (DSC), x-ray and electron diffraction (XRD, ED), and transmission, scanning and orientation imaging microscopy (TEM, SEM, OIM). My group has been an internationally recognized for the use of differential scanning calorimetry in quantitative kinetic and thermodynamic studies solid state reactions and phase transformations in thin films.

RESEARCH PROGRAM FUNDING

46. PI, LAM Research Corporation, unrestricted gift, \$40,000 (6/9/2014).
45. PI, REU Supplement, Collaborative Research: Towards Rare-Earth-Free Advanced Permanent Magnets – High-Anisotropy L_{10} Materials”, NSF CMMI-1259736, \$10,000 (04/14/2014-08/31/2014).
44. Co-PI, “Ultrathin Intermetallic Phases for Giant Spin Hall Effect”, NSF DMR-1411160, \$419,994, (9/1/2014-8/31/2017). PI: William Bailey.
43. Co-PI, “Co, Ni, Ru and Was 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).
42. Co-PI, “Multiscale Development of L_{10} Materials for Rare-Earth-Free Permanent Magnets”, PI, \$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 L_{10} 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 L_{10} 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: Vasyly 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, \$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 $L1_0$ 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 Cassasent, 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. Oriented Crystal Nanowire Interconnects

- US patent #14/204,050 filed on 3/11/2014 from US provisional patent #61/851,695 filed 3/12/2013, Inventors: Barmak, Katayun, Choi, Dooho, Coffey, Kevin R.

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

- US patent #13556-024USU1 from U.S. provisional patent #61/626,335, filed 9/23/2011, and titled “Thin Film Media Structure for Perpendicular Magnetic Recording” and US provisional patent #61/685,927, filed 3/27/2012, and titled “Underlayer to Control the Grain Size of Perpendicular Recording Media.” Inventors: Granz, Steven D., Barmak, Katayun, Kryder, Mark H.

2. Rare Earth-Free Permanent Magnetic Material

- International patent PCT/US2012/046935 filed on 7/16/2012. Inventors: Barmak, Katayun, Lewis, Laura, Shield, Jeffrey.

1. **US Patent 6846734** - 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

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)

- 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

Orientation Mapping, A. D. Rollett and K. Barmak, Chapter in Encyclopedia of Materials Science, in press.

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

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.

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

H-Index: 28

136. A. Darbal, K. Barmak, D. Choi, X. Liu, T. Sun, B. Yao, A. Warren, K. R. Coffey, “Conical dark field microscopy for grain size measurement in thin films”, in preparation.

135. J. Liu, K. Barmak, “Method for Measurement of Diffusivity: Calorimetric Studies of Fe/Ni Multilayer Thin Films” Scripta Mater., in press.

134. X. Liu, N. T. Nuhfer, A. P. Warren, M. F. Toney, K. R. Coffey, G. S. Rohrer and K. Barmak, “Grain size dependence of the twin length fraction in nanocrystalline Cu thin films via transmission electron microscopy based orientation mapping”, J. Mater. Res. (2015).
DOI: 10.1557/jmr.2014.393

133. J. Liu, K. Barmak “Interdiffusion in nanometric Fe/Ni multilayer films”, J. Vac. Sci. Technol. A **33**, 021510:1-4 (2015).
DOI: 10.1116/1.4905465

132. L. H. Lewis, F. E. Pinkerton, N. Bordeaux, A. Mubarak, E. Poirier, J. Goldstein, R. Skomski, and K. Barmak, “De Magnete et Meteorite: Cosmically motivated materials”, IEEE Magn. Lett. **5**, 5500104 (2014).
DOI: 10.1109/LMAG.2014.2312178

131. K. Barmak, A. Darbal, K. J. Ganesh and P. J. Ferreira, T. Sun, B. Yao, A. P. Warren, K. R. Coffey, J. M. Rickman, “Surface and grain boundary scattering in nanometric Cu thin films: A quantitative analysis including twin boundaries”, J. Vac. Sci. Technol. **A32**, 061503:1-8 (2014).
DOI: 10.1116/1.4894453

130. X. Liu, A. P. Warren, N. T. Nuhfer, A. D. Rollett,, K. R. Coffey and K. Barmak “Comparison of crystal orientation mapping-based and image-based measurement of grain size and grain size distribution in a thin aluminum film”, Acta Mater. **79**, 138-145 (2014).
DOI: <http://dx.doi.org/10.1016/j.actamat.2014.07.014>

129. D. Choi, X. Liu, P. K. Schelling, K. R. Coffey and K. Barmak, “Failure of semiclassical models to describe resistivity of nanometric, polycrystalline tungsten films”, J. Appl. Phys. **115**, 104308:1-7 (2014).

DOI: 10.1063/1.4868093

128. X. Liu, N. T. Nuhfer, J. S. Carpenter, A. Darbal, J. E. Ledonne, S. B. Lee, A. D. Rollett, K. Barmak, “Interfacial orientation and misorientation relationships in nanolamellar Cu/Nb composites using transmission electron microscope based orientation and phase mapping”, *Acta Mater.* **64**, 333-344 (2014).

DOI: <http://dx.doi.org/10.1016/j.actamat.2013.10.046>

127. R. Backofen, K. Barmak, K. R. Elder, A. Voigt, “Grain growth beyond Mullins, capturing the complex physics behind the universal grain size distributions in thin metallic films”, *Acta Mater.* **64**, 72-77 (2014).

DOI: <http://dx.doi.org/10.1016/j.actamat.2013.11.034>

126. K. Barmak, B. Wang, A. T. Jesanis, D. C. Berry, J. M. Rickman, “Quantitative kinetic models of the A1 to L1₀ transformation in FePt and related ternary alloy films”, *IEEE Trans. Magn.* **50**, 2001104:1-4 (2014).

DOI: 10.1109/TMAG.2013.2279132

125. L. H. Lewis, A. Mubarak, E. Poirier, N. Bordeaux, P. Manchanda, A. Kashyap, R. Skomski, J. Goldstein, F. E. Pinkerton, R. K. Mishra, R. C. Kubic Jr, and K. Barmak, “Inspired by nature: investigating tetrataenite for permanent magnet applications”, *J. Phys.: Condens. Matter* **26**, 064213 (2014).

DOI:10.1088/0953-8984/26/6/064213

124. J. M. Rickman, K. Barmak, “Simulation of metallic conduction in polycrystalline metallic films”, *J. Appl. Phys.* **114**, 133703:1-6 (2013).

DOI: <http://dx.doi.org/10.1063/1.4823985>

123. D. Choi, M. Moneck, X. Liu, S.-J. Oh, C. R. Kagan, K. R. Coffey and K. Barmak, “Crystallographic anisotropy of the resistivity size effect in single crystal tungsten nanowires”, *Nature Scientific Reports* **3**, 2591:1-4 (2013).

DOI: 10.1038/srep02591

122. S. Donegan, J. C. Tucker, A. D. Rollett, and K. Barmak, “Extreme value analysis of tail departure from log-normality in experimental and simulated grain size distributions”, *Acta Mater.* **61**, 5595–5604 (2013).

DOI: <http://dx.doi.org/10.1016/j.actamat.2013.06.001>

121. X. Liu, D. Choi, H. Beladi, N. T. Nuhfer, G. S. Rohrer, K. Barmak, “The five parameter grain boundary character distribution of nanocrystalline tungsten”, *Scripta Mater.* **69**, 413-416 (2013).

DOI: <http://dx.doi.org/10.1016/j.scriptamat.2013.05.046>

120. (*Review Article*) K. Barmak, E. Eggeling, D. Kinderlehrer, R. Sharp, S. Ta’asan, A. D. Rollett, K. R. Coffey “Grain Growth and the Puzzle of its Stagnation in Thin Films: The Curious Tale of a Tail and an Ear”, *Progress in Materials Science* **58**, 987-1055 (2013).

DOI: <http://dx.doi.org/10.1016/j.pmatsci.2013.03.004>

119. L. Li, X. Liu, Y. Zhang, N. T. Nuhfer, K. Barmak, P. A. Salvador, G. S. Rohrer, “Visible light photochemical activity of heterostructured core-shell materials composed of selected ternary titanates and ferrites coated by TiO_2 ”, *ACS Applied Materials and Interfaces*, 5064-5071 (2013).

DOI: dx.doi.org/10.1021/am4008837

118. (*Invited*) P. Manchanda, P. K. Sahota, A. Kashyap, M. J. Lucis, J. E. Shield, A. Mubarak, J. I. Goldstein, S. Constantinides, K. Barmak, L. H. Lewis, D. J. Sellmyer, and R. Skomski, “Intrinsic Properties of Fe-Substituted L_{10} Magnets”, *IEEE Trans. Mag.* **49**, 5194-5198 (2013).

117. (*Invited*) K. Barmak, B. Wang, A. T. Jesanis, D. C. Berry and J. M. Rickman, “ L_{10} FePt: Ordering, anisotropy constant and their relation to film composition”, *IEEE Trans. Mag.* **49**, 3284-3291 (2013).

DOI:10.1109/TMAG.2013.2242445

116. S. D. Granz, K. Barmak and M. H. Kryder, “Granular FePt:X(X = Ag, B, C, SiO_x , TiO_x) thin films for heat assisted magnetic recording”, *Eur. Phys. J. B* **86:81**:1-7(2013).

DOI: 10.1140/epjb/e2012-30655-3

115. A. D. Darbal, K. J. Ganesh, X. Liu, S.-B. Lee, J. Ledonne, T. Sun, B. Yao, A. P. Warren, G. S. Rohrer, A. D. Rollett, P. J. Ferreira, K. R. Coffey, and K. Barmak, “Grain boundary character distribution of nanocrystalline Cu thin films using stereological analysis of transmission electron microscope orientation maps”, *Micros. Microanal.* **19**, 111-119 (2013).

DOI:10.1017/S1431927612014055

114. D. Choi, C.-S. Kim, S. Chung, A. P. Warren, N. T. Nuhfer, M. F. Toney, K. R. Coffey K. Barmak, “The electron mean free path of tungsten and the resistivity of epitaxial (110) tungsten films”, *Phys. Rev. B* **86**, 04532:1-5 (2012).

DOI: 10.1103/PhysRevB.86.045432

113. J. S. Carpenter, X. Liu, A. Darbal, N.T. Nuhfer, R. J. McCabe, S. C. Vogel, J. E LeDonne, A. D. Rollett, K. Barmak, I. J. Beyerlein, N.A. Mara, “A comparison of texture results obtained using precession electron diffraction and neutron diffraction methods at diminishing length scales in ordered bi-metallic nanolamellar composites”, *Scripta Mater.* **67**, 336-339 (2012).

DOI: <http://dx.doi.org/10.1016/j.scriptamat.2012.05.018>

112. J. M. Rickman, K. Barmak, “Resistivity in rough metallic thin films: A Monte Carlo study”, *J. Appl. Phys.* **112**, 013704 (2012).

DOI: 10.1063/1.4732082

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9. K. Barmak, M. A. Lee, D. J. Schepis, K. Seshan, "An Instrument for Measurement of Pulsed Elements", IBM Technical Disclosure, rated publish.

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INTERNAL SERVICE ACTIVITIES – COLUMBIA UNIVERSITY

University

- Presidential Teaching Awards (2012)
- Presidential Teaching Awards (2013)
- Presidential Teaching Awards (2014)

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 Coadvisor of the Departmental Student Materials Society (1995-1998)
- Sigma Xi, Departmental officer

EXTERNAL ACTIVITIES

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-present).
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. Materials Research	Acta Materialia	J. Appl. Phys.
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)

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

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 A1 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 A1 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.

GRADUATE STUDENTS	DEGREE	YEAR	UNIVERSITY
31. Jiaxing Liu	Ph.D.	2017, expected	Columbia
30. Xuan Liu	Ph.D.	2013, expected	CMU
29. Xuan Liu	M.S.	2011	CMU
28. Dooho Choi	Ph.D.	2011	CMU
Title: Tungsten as a Next-generation Interconnect Metal in Semiconductor Devices			
27. Amith Darbal	Ph.D.	2011	CMU
Title: Surface and Grain Boundary Scattering in Nanometric Cu Films: A Quantitative Analysis including Intra-grain Boundaries			
26. Bincheng Wang	Ph.D.	2011	CMU
Title: Ultrahigh Density Magnetic Recording Media: Kinetic Experiments and Models of the A1 to L1 ₀ Phase Transformation in FePt and Related Ternary Alloy Films			
25. Bincheng Wang	M.S.	2008	CMU
24. Vineet Kumar	M.S.	2007	CMU
23. David C. Berry	Ph.D.	2007	CMU
Title: Ultrahigh Density Magnetic Recording Media: The A1 to L1 ₀ Phase Transformation in FePt and Related Ternary Alloy Films			
22. Shu Zhang (Mechanical Engineering)	Ph.D.	2007	CMU
21. David C. Berry	M.S.	2006	CMU
20. Wayne Archibald	Ph.D.	2004	CMU

Title: Microstructural Characterization of Al Thin Films and Foils: grain growth, grain boundary topology and statistics

19. Sukbin Lee	M.S.	2003	CMU
18. Iung-Hsin Hsieh	M.S.	2003	CMU
17. Chando Park	M.S.	2002	CMU
16. Ali Gungor	Ph.D.	2002	CMU
Title: Cu and Cu Alloy Thin Films: Evolution of Resistivity and Microstructure			
15. Jihwan Kim	Ph.D.	2001	Lehigh
14. Srinivasan Kumar	M.S.	2000	CMU
13. Gene A. Lucadamo	Ph.D.	2000	Lehigh
Title: A Study of the Kinetics and Microstructure Evolution during Reactions of Niobium/Aluminum and Titanium/Aluminum Multilayer Thin-Films			
12. W. Scott Tong	Ph.D.	2000	Lehigh
11. Hyungwook Kim	M.S.	1999	CMU
10. Derrick T. Carpenter	Ph.D.	1998	Lehigh
9. Roger A. Ristau	Ph.D.	1998	Lehigh
Title: Microstructural and Magnetic Characterization of CoPt and FePt Thin Films			
8. Balaji Gadicharla	M.S.	1997	Lehigh
7. Douglas Puerta	M.S.	1997	Lehigh
6. Gene A. Lucadamo	M.S.	1996	Lehigh
5. W. Scott Tong	M.S.	1996	Lehigh
4. Cindy M. Petronis	M.S.	1996	Lehigh
3. Ellen Youngblood	M.S.	1995	Lehigh
2. Roger A. Ristau	M.S.	1995	Lehigh
1. Lance Muzslay	M.S.	1994	Lehigh

MASTERS STUDENT SCIENCE REPORTS – COLUMBIA UNIVERSITY

8. Wendi Cheng	Spring 2014
7. Haoming Lu	Spring 2014
6. Hao Duan	Spring 2014
5. Yiwei Jin	Fall 2013
4. Jingjing Ling	Fall 2013
3. Zhaoyi Li	Spring 2012
2. Ying Wang	Spring 2012
1. Yiran Lu	Spring 2012

UNDERGRADUATE STUDENTS	YEAR	UNIVERSITY
34. Christina Floristean	2014	Columbia
33. Lauren Riddiford	2014	Columbia
32. Sloka Gundala	2014	Columbia
31. David Schutzman	2011	CMU
30. Justin Dersh	2009	CMU
29. Andrew Jesanis	2009	CMU
28. Shannon Andersen	2008	FSU/CMU
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26. Alexander Hansen	2008	CMU
25. Scott Roberts	2007	CMU
24. Terry Shyu	2007-08	CMU
23. Hanness Eggenschwiller	2006	CMU/EPFL
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21. Nelson Cheung	2006	CMU
20. Ysela Chiari	2005	FAMU/CMU
19. Benjamin Nowak	2005	CMU
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17. Velouse Pierre	2004	FAMU/CMU
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