

# MEGAN FRARY

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## EDUCATION

Northwestern University, Materials Science & Engineering, B.S., 1999  
Northwestern University, Materials Science & Engineering, M.S., 2001  
Massachusetts Institute of Technology, Materials Science & Engineering, Ph.D., 2005

## PROFESSIONAL EXPERIENCE

2005-Present: Assistant Professor of Materials Science & Engineering, *Boise State University*, Boise, ID  
2002-2005: Research Assistant, *Massachusetts Institute of Technology*, Cambridge, MA  
2002-2004: Teaching Assistant, *Massachusetts Institute of Technology*, Cambridge, MA  
2001-2002: Research Engineer, *Caterpillar, Inc.*, Peoria, IL  
1999-2001: Research Assistant, *Northwestern University*, Evanston, IL

## TEACHING AND MENTORING EXPERIENCE

- Research supervisor for eight (five current) graduate students and fourteen (six current) undergraduates at Boise State University.
- Instructor for ENGR 120, “Introduction to Engineering”, Fall Semester 2009, Boise State University.
- Instructor for MSE 508, “Solid State Thermodynamics”, Spring Semester 2009, Boise State University.
- Instructor for MSE 497/597, “Application of Mathematica in Materials Science and Engineering”, Fall Semesters, 2008, 2009, Boise State University.
- Instructor for MSE 312, “Mechanical Behavior of Materials”, Spring Semesters 2006, 2007, 2008, Boise State University.
- Instructor for MSE 305, “Bonding, Crystallography and Crystal Defects”, Fall Semesters 2005, 2006, 2007, 2008, Boise State University.
- Faculty advisor for the Boise State University Materials Science and Engineering Student Club, 2005 – present.
- Undergraduate Research Advisor, Massachusetts Institute of Technology, 11/02-8/03, 2/04-6/05.

## PUBLICATIONS (\* indicates undergraduate author)

1. B. Albiston\*, M. Frary, “Twin Boundary Evolution during Grain Boundary Engineering of Stainless Steel,” manuscript in preparation, to be submitted to *Scripta Materialia*.
2. L. Bonfrisco, M. Frary, “Effects of Crystallographic Orientation on the Early Stages of Oxidation Behavior in Nickel and Chromium,” *Journal of Materials Science*, **45** (6): 1663 (2010).
3. P. Andersen\*, M. Bentancur\*, A.J. Moll, M. Frary, “Microstructural Effects During Chemical Mechanical Planarization,” *Journal of the Electrochemical Society*, **157**, H120 (2010).
4. S.Y. Chyung, A.J. Moll, B. Marx, M. Frary, J. Callahan, “Improving Engineering Students' Cognitive and Affective Preparedness with a Pre-Instructional E-Learning Strategy,” *Advances in Engineering Education*, **2**, 13 (2010).

5. M. Frary, S.M. Schlegel, S. Hopkins\*, E. Young\*, J. Cole, T. Lillo, "Analysis of Precipitate Redistribution in Inconel 617 Using Integrated Electron Backscatter Diffraction and Energy Dispersive Spectroscopy," *Microscopy and Microanalysis*, **15** (S2): 24 (2009).
6. T. Lillo, J. Cole, M. Frary, S. M. Schlegel, "Influence of Grain Boundary Character on Creep Void Formation of Alloy 617," *Metallurgical and Materials Transactions*, **40**, 2803 (2009).
7. S. M. Schlegel, S. Hopkins\*, E. Young\*, T. Lillo, J. Cole, M. Frary, "Precipitate Redistribution during Creep of Alloy 617," *Metallurgical and Materials Transactions*, **40**, 2812 (2009).
8. S. M. Schlegel, S. Hopkins\*, M. Frary, "Effects of Grain Boundary Engineering on Microstructural Stability during Annealing," *Scripta Materialia*, **61**, 88 (2009).
9. M. Gerritsen, J.T. Oxford, M. Frary, J. Henderson\*, J.M. Hampikian, "Immuno-SEM Characterization of Developing Bovine Cartilage," *Materials Science and Engineering C*, **28**, 341 (2008).
10. M. Frary, C.A. Schuh, "Correlation-Space Description of the Percolation Transition in Composite Microstructures," *Physical Review E*, **76**, 041108 (2007).
11. P.J. Andersen, M. Frary, "Influence of copper microstructure on aggressive chemical mechanical planarization processes," *MRS Proceedings*, **991**, C05-04 (2007).
12. M. Frary, "Determination of Three-Dimensional Grain Boundary Connectivity from Two-Dimensional Microstructures," *Scripta Materialia*, **57**, 205 (2007).
13. M. Demkowicz, A. S. Argon, D. Farkas, M. Frary, "Simulation of Plasticity in Nanocrystalline Silicon," *Philosophical Magazine*, **87**, 4253 (2007).
14. C.A. Schuh, M. Frary, "Correlations beyond the Nearest-Neighbor Level in Grain Boundary Networks," *Scripta Materialia*, **54**, 1023 (2006).
15. M. Frary, C.A. Schuh, "Grain Boundary Networks: Scaling Laws, Preferred Cluster Structure, and Their Implications for Grain Boundary Engineering," *Acta Materialia*, **53**, 4323 (2005).
16. M. Frary, C.A. Schuh, "Connectivity and Percolation Behavior of Grain Boundary Networks in Three Dimensions," *Philosophical Magazine*, **85**, 1123 (2005).
17. M. Frary, C.A. Schuh, "Applications of Percolation Theory to Grain Boundary Engineering," *Proceedings of DETC '04*, Salt Lake City, UT, American Society of Mechanical Engineers (2004).
18. M. Frary, C.A. Schuh, "Modeling and Simulation of the Percolation Problem in High- $T_c$  Superconductors: Role of Crystallographic Constraints on Grain Boundary Connectivity," *MRS Proceedings*, Volume 819, N7.7, Materials Research Society (2004).
19. M. Frary, C.A. Schuh, "Percolation and statistical properties of low and high-angle interface networks in polycrystalline ensembles," *Physical Review B*, **69**, 134115 (2004).
20. M. Frary, C.A. Schuh, "Nonrandom Percolation Behavior of Grain Boundary Networks in High- $T_c$  Superconductors," *Applied Physics Letters*, **83**, 3755-3757 (2003).
21. M. Frary, C. A. Schuh, "Combination Rule for Deviant CSL Boundaries at Triple Junctions," *Acta Materialia*, **51**, 3731-3743 (2003).
22. M. Frary, S. Abkowitz, S. M. Abkowitz, D.C. Dunand, "Microstructure and Mechanical Properties of Ti/W and Ti-6Al-4V/W Composites Fabricated by Powder-Metallurgy," *Materials Science and Engineering A*, **344** (1-2), 103-112 (2003).

23. M. Frary, C. Schuh, D.C. Dunand, "Kinetics of Biaxial Dome Formation by Transformation Superplasticity of Titanium Alloys and Composites", *Metallurgical and Materials Transactions A*, **33A**, 1669-1680 (2002).
24. M. Frary, C. Schuh, D.C. Dunand, "Strain Ratcheting of Titanium upon Reversible Alloying with Hydrogen", *Philosophical Magazine A*, **81**, 197-212 (2001).

**PRESENTATIONS (\* indicates undergraduate author, † indicates presenter if not M. Frary)**

1. (INVITED) M. Frary, "Three-Dimensional Grain Boundary Networks: Modeling and Connections to Experimental Data," to be presented at the 2010 TMS Annual Meeting, Seattle, WA, February 2010.
2. M. Luke<sup>†</sup>, D. Butt, M. Frary, "Comparison of Microstructural Evolution of Nickel During Conventional and Spark Plasma Sintering," to be presented at the 2010 TMS Annual Meeting, Seattle, WA, February 2010.
3. J. Stein<sup>†</sup>, M. Frary, "Role of Grain Boundary Character Distribution on Dynamic Recrystallization Using Monte Carlo Simulations," to be presented at the 2010 TMS Annual Meeting, Seattle, WA, February 2010.
4. J. Burns<sup>†</sup>, M. Frary, "Effects of Stress and Temperature on the Fatigue Crack Growth Behavior and Microstructural Evolution of Alloy 230," to be presented at the 2010 TMS Annual Meeting, Seattle, WA, February 2010.
5. J. Perkins<sup>†</sup>, D. Butt, M. Frary, "Spark Plasma Sintering of Tungsten and Tungsten-Ceria Powders," to be presented at MS&T 2009, Pittsburgh, PA, October 2009.
6. (INVITED) M. Frary, "Analysis of Precipitate Redistribution in Inconel 617 Using Electron Backscatter Diffraction and Energy Dispersive Spectroscopy," presented at the Microscopy and Microanalysis Conference, Richmond, VA, July 2009.
7. M. Luke, J. Perkins<sup>†</sup>, W. Windes, D. Butt, M. Frary, "Microstructure and Sintering Kinetics of Nickel and Tungsten-Based Materials Consolidated By Spark Plasma Sintering," presented at the 8<sup>th</sup> Pacific Rim Conference on Ceramic and Glass Technology, Vancouver, CA, July 2009.
8. S. Schlegel, T. Lillo, J. Cole, S. Hopkins\*, E. Young\*, M. Frary, "Precipitate Redistribution during Creep of Alloy 617," presented at the 2009 TMS Annual Meeting, San Francisco, CA, February 2009.
9. M. Luke<sup>†</sup>, J. Perkins, W. Windes, D. Butt, M. Frary, "Microstructural Evolution during Spark Plasma Sintering of Ni and W," presented at the 2009 TMS Annual Meeting, San Francisco, CA, February 2009.
10. B. Albiston\*, M. Frary, "Microstructural Evolution during Grain Boundary Engineering of Stainless Steel," presented at the 2009 TMS Annual Meeting, San Francisco, CA, February 2009.
11. S. Schlegel<sup>†</sup>, M. Frary, "Microstructural Stability in Grain Boundary Engineered Materials," presented at the 2008 TMS Annual Meeting, New Orleans, LA, March 2008.
12. L. Bonfrisco<sup>†</sup>, M. Frary, "Effects of Surface Orientation on High-Temperature Oxidation Behavior," presented at the 2008 TMS Annual Meeting, New Orleans, LA, March 2008.
13. P. Andersen<sup>\*†</sup>, M. Bentancur\*, M. Frary, "Microstructural Modification of Thick Copper Films to Optimize Chemical-Mechanical Planarization of Through-Wafer Interconnects," presented at the 2008 TMS Annual Meeting, New Orleans, LA, March 2008.

14. M. Frary, L. Hindman\*, D. Shrader\*, A. Jain, "Modeling Realistic Two and Three-Dimensional Microstructures: The Effects of Microstructural Anisotropy on Percolative Processes," presented at MS&T 2007, Detroit, MI, September 2007.
15. P.J. Andersen\*<sup>†</sup>, M. Frary, "Influence of copper microstructure on aggressive chemical mechanical planarization processes," presented at MRS Spring Meeting, April 2007.
16. M. Frary, "Development of 3D microstructural models for intergranular phenomena," presented at NASA Glenn Research Center, January 2007 (invited).
17. L. Bonfrisco<sup>†</sup>, M. Frary, "The Impact of Crystal Orientation on Oxidation and Corrosion of Polycrystalline Nickel," presented by co-author at NASA Idaho Space Grant Consortium Research Conference, October 2006.
18. M. Gerritsen, J.M. Hampikian<sup>†</sup>, J.T. Oxford, M. Frary, J. Henderson\*, "Immuno-SEM Characterization of Developing Bovine Catilage," presented by co-author at MS&T 2006, October 2006 (invited).
19. M. Frary, C.A. Schuh, "Percolation Theory for Two-Phase Materials with Nonrandom Topologies," presented at TMS Annual Meeting, March 2006.
20. M. Frary, C.A. Schuh, "Length Scale of Correlations in Grain Boundary Networks," presented at Materials Research Society, November 2005.
21. M. Frary, C.A. Schuh, "The Role of Crystallographic Constraints on the Percolation Behavior of Three-Dimensional Grain Boundary Networks," presented at American Ceramics Society Annual Meeting, April 2005.
22. M. Frary, C.A. Schuh, "Modeling and Simulation of Grain Boundary Engineered Microstructures," presented for the Professor Nicholas Grant Student Lecture Series at the ASM Boston Chapter, 2005.
23. M. Frary, C.A. Schuh, "Modeling and Simulation of the Percolation Problem in High-T<sub>c</sub> Superconductors: Role of Crystallographic Constraints on Grain Boundary Connectivity," presented at Materials Research Society, April 2004.
24. M. Frary, C.A. Schuh, "Scaling Laws for Grain Boundary Networks," presented by co-author at TMS Annual Meeting, 2004.
25. M. Frary, C.A. Schuh, "Crystallographic Constraints around Triple Junctions and Their Effect on Grain Boundary Network Character," presented at Materials Science & Technology 2003.
26. M. Frary, C.A. Schuh, "Percolation Theory for Grain Boundary Networks," presented by co-author at Plasticity 2003 (Invited).
27. M. Frary, P.J. Maziasz<sup>†</sup>, R.W. Swindeman, "Modified Stainless Steel Alloys for High Temperature Engine Components," presented at the Stainless Steels and Specialty Materials Conference, ASM, 2002.

## AWARDS AND MEMBERSHIPS

- Recipient of 2008 Bradley Stoughton Award for Young Teachers from ASM International
- Recipient of 2007 NSF CAREER Award
- Member of team that won a 2003 R&D 100 Award, "CF8C-Plus: New Cast Stainless Steel for High-Temperature Performance"
- Alumni Advisory Board member, Northwestern University Department of Materials Science and Engineering, 2002 – 2008.
- Member of Materials Research Society (MRS), ASM International, and The Minerals, Metals, and Materials Society (TMS), American Society for Engineering Education (ASEE), and Sigma Xi.

## PROFESSIONAL SERVICE

- Member of the Boise State University Honors/Scholarship Committee (2009 – present)
- Member of the Marcus A. Grossman Young Author Award and Henry Marion How Medal Selection Committee, ASM International, 2009 – present. Committee Vice-Chair, 2010.
- Member of the TMS Women In Materials Science Committee, 2008 – present.
- Member of Outreach Committee, College of Engineering, Boise State University, 2007-09.
- Boise State Teaching Scholar for Undergraduate Research, 2007-08.
- Member of the Board of Review for *Metallurgical and Materials Transactions A*, 2006 – present.
- Advisor to Boise State University Materials Science and Engineering Student Club (student chapter of Material Advantage (ASM, TMS, AIST, ACerS) and Materials Research Society, 2005 – present.
- Academic advisor to undergraduates in Materials Science and Engineering at Boise State University, 2005 – present.
- Participant in Women in Technical Careers Lunch Series, Boise, ID, 2005–2008.
- Member of Teaching and Learning Committee and Computer Committee, College of Engineering, Boise State University, 2005-07.
- Attended Boot Camp for Professors (week-long workshop), 2008.
- Attended ASEE (three-day) Workshop “How to Engineer an Engineering Education,” 2006.
- Attended Boise State University Faculty Advising Institute on academic advising, 2005.
- Affiliate of Center for Advanced Energy Studies, a consortium among Boise State University, Idaho National Laboratory, Idaho State University and University of Idaho.
- Co-chair of ABET Accreditation Committee, Materials Science and Engineering Department, Boise State University, 2006 – present.
- Member of Materials Research Society NOVA Subcommittee that is working with WGBH to develop a NOVA television series on materials science, an educational website to accompany the shows, and a nation-wide outreach program related to the series.

## STUDENT ADVISING

- Currently supervising six undergraduate students
- Currently supervising five graduate students
- Total undergraduate students advised: 14
- MS advisees graduated: Louis Bonfrisco (now a Nuclear Test Engineer at Puget Sound Naval Shipyard), Scott Schlegel (now a Research Engineer at ATI Wah Chung), Matt Luke (now an instructor at the Navy Nuclear Power School), Jatu Burns
- BS advisees graduated: Mariela Bentancur (now a Materials Engineer at Idaho National Laboratory), Patrick Andersen (now a Nuclear Engineer at Puget Sound Naval Shipyard), Wade Lanning (now a Ph.D. student in MSE at Penn State University), Sharla Hopkins, David Shrader (now a Ph.D. student in MSE at University of Wisconsin)