Jeremy K. Mason

Department of Mechanical Engineering
Boğaziçi University
Bebek 34342 Istanbul
Turkey

Work Tel. +90 212 359 6437
Home Tel: +90 530 950 1676
Fax. +90 212 287 2456
E-mail: jeremy.mason@boun.edu.tr

RESEARCH INTERESTS

Microstructure evolution, texture analysis, grain boundary properties, continuum dislocation theory, statistical topology.

EDUCATION

9/05 – 6/09 **Massachusetts Institute of Technology**, Cambridge, MA, USA
Ph.D. in Materials Science and Engineering
Thesis – *Analysis of Crystallographic Texture Information by the Hyperspherical Harmonic Expansion*

9/01 – 6/05 **Massachusetts Institute of Technology**, Cambridge, MA, USA
B.S. in Physics
Thesis – *Statistical Physics of Dislocation Nucleation by Nanoindentation*

PROFESSIONAL EXPERIENCE

08/1 –3/14 **Assistant Professor**, Department of Mechanical Engineering, Boğaziçi University, Istanbul, TR

9/11 – 4/13 **Lawrence Fellow**, Advised by Mukul Kumar, LLNL, Livermore, CA, USA
Began development of a massively parallel code to simulate three-dimensional microstructural evolution, allowing for fully anisotropic grain boundary energies and mobilities.
Established a stereological procedure to predict the stability of three-dimensional microstructures exposed to extreme environments.

9/09 – 7/11 **Postdoctoral Scholar**, Advised by Prof. Robert D. MacPherson, IAS, Princeton, NJ, USA
Developed codes to simulate two- and three-dimensional normal grain growth for uniform boundary energies with unprecedented accuracy.
Refined and implemented a group-theoretic formulation to completely describe the statistical topology of two- and three-dimensional microstructures.

9/05 – 6/09 **Graduate Researcher**, Advised by Prof. Christopher A. Schuh, MIT, Cambridge, MA, USA
Developed a quaternion-based approach to the analysis of orientations and crystallographic texture for use by the general scientific community.
Established the utility of the quaternion-based approach by extending the Mackenzie-Handscomb disorientation distribution to arbitrary crystallographic textures.

TEACHING EXPERIENCE

Department of Mechanical Engineering, Boğaziçi University

Physical Metallurgy	Instructor of undergraduate course on the description of crystals, structure determination, diffusion, recovery, recrystallization, grain growth, and nucleation and growth.
Introduction to Materials Science	Instructor of undergraduate course on materials and properties, atomic bonding and arrangements, structural imperfections, deformation of materials, and nonmetallic materials.

Department of Materials Science and Engineering, Massachusetts Institute of Technology

Mechanics of Materials	Teaching assistant for graduate course on how the macroscale mechanical behavior of materials originates from fundamental, microscale mechanisms of elastic and inelastic deformation.
Solid State Chemistry	Teaching assistant for undergraduate course on the basic principles of chemistry, electronic structure, chemical bonding, atomic arrangements, chemical kinetics, and phase diagrams.

AWARDS

Lawrence Fellowship (2011 – 2014)
Membership in the School of Mathematics at the Institute for Advanced Study (2009 – 2011)
Acta Materialia Student Award (2009)
DMSE Best Ph.D. Thesis Research Award (2009)
DMSE Graduate Student Teaching Award (2009)
NSF Graduate Research Fellowship Honorable Mention (2005, 2006)

INVITED TALKS

12/13 Mason, J.K., Lazar, E.A., MacPherson, R.D., and Srolovitz, D.J. "Rigorous quantification of the grain growth microstructure in 2D and 3D" at Experimental Mathematics Colloquium, Department of Mathematics, University of Copenhagen, Copenhagen, DK.

10/12 Mason, J.K., Lazar, E.A., MacPherson, R.D., and Srolovitz, D.J. "Rigorous quantification of the grain growth microstructure in two and three dimensions." at Materials Defects: Mathematics, Computation, and Engineering, University of California, Los Angeles, CA, USA.

11/11 Mason, J.K. "Front-tracking simulations of grain growth and identification of the steady state." at Challenge and Modeling of Multiscale Problems in Mechanics and Materials, Institute for Mathematical Sciences, Singapore, Republic of Singapore.

8/11 Mason, J.K., Lazar, E.A., MacPherson, R.D., and Srolovitz, D.J. "Characteristics of two- and three-dimensional microstructures." at Institute for Mathematics and its Applications, University of Pennsylvania, Philadelphia, PA, USA.

12/10 Mason, J.K., Lazar, E.A., MacPherson, R.D., and Srolovitz, D.J. "Characteristics of coarsening cellular structures in 2D." at Workshop on Topology: Identifying Order in Complex Systems, Institute for Advanced Study, Princeton, NJ, USA.

PRESENTATIONS

11/12 Mason, J.K., Lazar, E.A., MacPherson, R.D., and Srolovitz, D.J. "Topological entropy and distance between grain boundary networks." at Materials Research Society Fall Meeting, Boston, MA, USA.

6/08 Mason, J.K., and Schuh, C.A. "Representations of textures using quaternion distributions." at International Conference on Textures of Materials, Carnegie Mellon University, Pittsburgh, PA, USA

1/08 Mason, J.K., and Schuh, C.A. "An alternative to the Euler angle presentation of texture information." at International Symposium on Plasticity, Kailua, HI, USA.

PUBLICATIONS

Book Sections

Mason, J.K., and Schuh, C.A., Representations of Texture. In: Schwartz, A.J., Kumar, M., Adams, B.L., and Field, D.P., editors. Electron Backscatter Diffraction in Materials Science. Springer, 2009.

Refereed Journal Publications

Li, S.F., Mason, J.K., Lind, J., and Kumar, M. "Quadruple nodes and grain boundary connectivity in three dimensions" *Acta Materialia* 2014;46:220.

Lazar, E.A., Mason, J.K., MacPherson, R.D., and Srolovitz, D.J. "Statistical topology of three-dimensional Poisson-Voronoi cells and cell boundary networks" *Physical Review E* 2013;88:063309.

Mason, J.K., and Johnson, O.K. "Convergence of the hyperspherical harmonic expansion for crystallographic texture" *Journal of Applied Crystallography* 2013;46:1772.

Mason, J.K., Johnson, O.K., Reed, B.W., Li, S.F., Stolken, J.S., and Kumar, M. "Statistics of twin-related domains and the grain boundary network" *Acta Materialia* 2013;61:6524.

LaGrange, T., Reed, B.W., Wall, M., Mason, J., Barbee, T., and Kumar, M. "Topological view of the thermal stability of nanotwinned copper" *Applied Physics Letters* 2013;102:011905.

Mason, J.K., Lazar, E.A., MacPherson, R.D., and Srolovitz, D.J. "Statistical topology of cellular networks in two and three dimensions" *Physical Review E* 2012;86:051128.

Patala, S., Mason, J.K., Schuh C.A. "Improved representation of misorientation information for grain boundary science and engineering" *Progress in Materials Science* 2012;57:1383.

Lazar, E.A., Mason, J.K., MacPherson, R.D., and Srolovitz, D.J. "Complete topology of cells, grains, and bubbles in three-dimensional microstructures" *Phyiscal Review Letters* 2012;109:095505.

Mason, J.K., Ehrenborg, R. and Lazar, E.A. “A geometric formulation of the law of Aboav–Weaire in two and three dimensions” *Journal of Physics A: Mathematical and Theoretical* 2012;45:065001.

Carlsson, G., Gorham, J., Kahle, M. and Mason, J.K. “Computational topology for configuration spaces of hard disks” *Physical Review E* 2012;85:019905.

Lazar, E.A., Mason, J.K., MacPherson, R.D., and Srolovitz, D.J. “A more accurate three-dimensional grain growth algorithm” *Acta Materialia* 2011;59:6837.

Mason, J.K., and Schuh, C.A. “Expressing crystallographic textures through the orientation distribution function: conversion between the generalized spherical harmonic and hyperspherical harmonic expansions” *Metallurgical and Materials Transactions A* 2009;40:2590.

Mason, J.K., and Schuh, C.A. “The generalized Mackenzie distribution: disorientation angle distributions for arbitrary textures” *Acta Materialia* 2009;57:4186.

Mason, J.K. “The Relationship of the Hyperspherical Harmonics to *SO*(3), *SO*(4) and Orientation Distribution Functions” *Acta Crystallographica A* 2009:65:259.

Mason, J.K., and Schuh, C.A. “Hyperspherical harmonics for the representation of crystallographic texture” *Acta Materialia* 2008;56:6141.

Mason, J.K., and Schuh, C.A. “Correlated grain-boundary distributions in two-dimensional networks” *Acta Crystallographica A* 2007;63:315.

Mason, J.K., Lund, A.C., and Schuh, C.A. “Determining the activation energy and volume for the onset of plasticity during nanoindentation.” *Physical Review B* 2006;73:054102.

Schuh, C.A., Mason, J.K., and Lund, A.C. “Quantitative insight into dislocation nucleation from high-temperature nanoindentation experiments.” *Nature Materials* 2005;4:617.