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RESEARCH INTERESTS

Microstructure evolution, texture analysis, grain boundary properties, solidification dynamics, 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

8/17 – Now **Assistant Professor**, Department of Materials Science and Engineering, University of California, Davis, CA, USA

1/17 – 7/17 **Visiting Assistant Professor**, Department of Mathematics, The Ohio State University, Columbus, OH USA

9/16 – 12/16 **Visiting Assistant Professor**, Institute for Computational and Experimental Research in Mathematics, Brown University, Providence, RI, USA

8/13 – 12/16 **Assistant Professor**, Department of Mechanical Engineering, Boğaziçi University, Istanbul, TR

9/11 – 4/13 **Lawrence Fellow**, Advised by Mukul Kumar, LLNL, Livermore, CA, USA

9/09 – 7/11 **Postdoctoral Scholar**, Advised by Prof. Robert D. MacPherson, IAS, Princeton, NJ, USA

9/05 – 6/09 **Graduate Researcher**, Advised by Prof. Christopher A. Schuh, MIT, Cambridge, MA, USA

TEACHING EXPERIENCE

Department of Mechanical Engineering, Boğaziçi University

16/17-2 **Linear Algebra (MATH 2568)**: Undergraduate course on matrix algebra, vector spaces and linear maps, bases and dimension, eigenvalues and eigenvectors.

15/16-2
14/15-2 **Advanced Engineering Mathematics II (ME 502)**: Graduate course on partial differential equations, the Laplace, diffusion, and wave equations, integral equations, functions of a complex variable, conformal mapping, complex integral calculus and the residue theorem.

15/16-2
14/15-2 **Graduate Seminar (ME 579)**: Graduate course that widens students' perspectives and awareness of topics of interest to mechanical engineers through seminars offered by faculty, guest speakers and graduate students.

15/16-1
14/15-1 **Introduction to Computational Materials Science (ME 58F)**: Graduate course that introduces students to the capabilities and limitations of modern computational materials science methods, and gives some practical experience in their implementation and use.

15/16-1
13/14-2 **Physical Metallurgy (ME 316)**: Undergraduate course on the description of crystals, structure determination, thermodynamics of crystals, diffusion, recovery, recrystallization, grain growth, phase transformations, and nucleation and growth.

15/16-2
14/15-1,2
13/14-1

Materials Science (ME 210): Undergraduate course on materials and properties, atomic bonding and arrangements, structural imperfections, atom movements, deformation of materials, physical properties, modifying properties through structural changes, and nonmetallic materials.

Department of Materials Science and Engineering, Massachusetts Institute of Technology

08/09-2

Mechanical Behavior of Materials (3.22): Teaching assistant for graduate course on how the macroscale mechanical behavior of materials originates from fundamental, microscale mechanisms of elastic and inelastic deformation.

04/05-1
03/04-1
02/03-1

Introduction to Solid State Chemistry (3.091): Teaching assistant for undergraduate course on the basic principles of chemistry, electronic structure, chemical bonding, atomic arrangements, chemical kinetics, and phase diagrams.

GRANTS

4/15 – 3/18 **Predictive Materials Design: Simulating Dynamic Recrystallization**
Principle investigator for TÜBİTAK, Kariyer Geliştirme Programı (3501), project number 214M257. Funded for three years, amount awarded 110569 TL.
Support one student to develop FERME (Finite-Element Representation of Microstructure Evolution), a massively parallel code to simulate microstructure evolution in industrially relevant conditions.

12/14 – 11/17 **Quantitative Predictions of Microstructure Evolution by Cellular Automata**
Principle investigator for Bilimsel Araştırma Projeleri, SUP, project code 8920. Funded for three years, amount awarded 122204 TL.
Support one student to develop CARME (Cellular Automata Representation of Microstructure Evolution), a simulation code to predict the properties and evolution of a grain structure.

AWARDS

9/11 – 9/14 Lawrence Fellowship
09 Acta Materialia Student Award
09 DMSE Best Ph.D. Thesis Research Award
09 DMSE Graduate Student Teaching Award
05, 06 NSF Graduate Research Fellowship Honorable Mention

INVITED TALKS

8/16 Mason, J.K. “Statistical Topology of the Grain Growth Microstructure” at Geometry Seminar, Institute of Science and Technology Austria, Klosterneuburg, AT.
10/15 Mason, J.K. “Swatches, cloths, and the topology of statistically-defined cell complexes” at Koç Üniversitesi Science Seminar, Koç University, Istanbul, TR.
3/15 Mason, J.K. “Statistical topology of complex spaces in the physical sciences” at Fizik Bölümü Semineri, Boğaziçi University, Istanbul, TR.
1/15 Mason, J.K. “Statistical topology of complex spaces in the physical sciences” at Séminaire de l’Institut Lumière Matière, Université Claude Bernard Lyon 1, Lyon, FR.
11/14 Mason, J.K. “Statistical topology of complex spaces in the physical sciences” at Istanbul Center for Mathematical Sciences, Boğaziçi University, Istanbul, TR.
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

9/15 Mason, J.K. “Swatches, cloths, and the topology of statistically-defined cell complexes” at Shape Up 2015, Exercises in Materials Geometry and Topology, Technical University of Berlin, Berlin, DE.

10/14 Mason, J.K., MacPherson, R.D., and Schweinhart, B. “Quantification and comparison of random structures.” at International Conference on Multiscale Materials Modeling, Berkeley, CA, USA.

6/14 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 International Workshop on Physics-based Models and Experimental Verification, Cesme, Turkey.

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

Akiner, T., Mason, J., and Ertürk, H. “Thermal Characterization Assesment of Rigid and Flexible Water Models in a Nanogap Using Molecular Dynamics” *Chemical Physics Letters* 2017;687:270.

Lutz, F.H., Mason, J.K., Lazar, E.A., and MacPherson, R.D. “Roundness of grains in cellular microstructures” *Physical Review E* 2017;96:023001.

Akıner, T., Mason, J.K., and Ertürk, H. “Nanolayering around and thermal resistivity of the water-hexagonal boron nitride interface” *The Journal of Chemical Physics* 2017;147:044709.

Mason, J.K. “Stability and motion of arbitrary grain boundary junctions” *Acta Materialia* 2017;125:286.

Akıner, T., Mason, J.K., and Ertürk, H. “A new interlayer potential for hexagonal boron nitride” *Journal of Physics: Condensed Matter* 2016;28:385401.

Schweinhart, B., Mason, J.K., and MacPherson, R.D. “Topological similarity of random cell complexes and applications” *Physical Review E* 2016;93:062111.

Mason, J.K., Lazar, E.A., MacPherson, R.D., and Srolovitz, D.J. “Geometric and topological properties of the canonical grain-growth microstructure” *Physical Review E* 2015;92:063308.

Mason, J.K. “Grain boundary energy and curvature in Monte Carlo and cellular automata simulations of grain boundary motion” *Acta Materialia* 2015;94:162.

Mason, J.K., Lind, J., Li, S.F., Reed, B.W., and Kumar, M. “Kinetics and anisotropy of the Monte Carlo model of grain growth” *Acta Materialia* 2015;82:155.

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.

Conference Proceedings

Schuh, C.A., Mason, J.K., Lund, A.C., and Hodge, A.M. “High temperature nanoindentation for the study of flow defects” *MRS Proceedings* 2004;841:R4.8