

Michael A. Groeber

Associate Professor, Integrated Systems Engineering
Associate Professor, Mechanical and Aerospace Engineering
The Ohio State University
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EXECUTIVE POSITIONS

Director of Manufacturing, Institute for Materials and Manufacturing Research, OSU
Faculty Director, Artificially Intelligent Manufacturing Systems Lab, OSU
Research Director, Minority Leaders Research Collaboration Program, OSU-AFRL

EDUCATION

Doctor of Philosophy in Materials Science and Engineering

The Ohio State University, Columbus, OH (August 2007) *Magna Cum Laude*
Research Adviser: Dr. Somnath Ghosh
Co-Advisor: Dr. Hamish Fraser

Master of Science in Materials Science and Engineering

The Ohio State University, Columbus, OH (August 2006) *Magna Cum Laude*
Research Adviser: Dr. Somnath Ghosh
Co-Advisor: Dr. Hamish Fraser

Bachelor of Science in Materials Science and Engineering

The Ohio State University, Columbus, OH (June 2003) *Cum Laude*

RESEARCH

Professional Research:

Research Foci: 1) AI/ML-Controlled Robotic Manufacturing Systems 2) Microstructurally Informed Design Tools for Additive Manufacturing, 3) Physics-Aware Machine Learning for Materials and Manufacturing, and 4) Unified Characterization Frameworks for Analyzing and Representing Microstructure in 3D

The Ohio State University (2018-Present)

Associate Professor of Integrated Systems Engineering (2018-Present)

Associate Professor of Mechanical and Aerospace Engineering (2018-Present)

Research Foci: 1) Microstructurally Informed Design Tools for Additive Manufacturing, 2) Autonomous, Multi-Modal Serial-Sectioning Tools and 3) Unified Characterization Frameworks for Analyzing and Representing Microstructure in 3D

Air Force Research Laboratory (2009-2018)

Senior Materials Research Scientist (2014-2018)

Materials Research Scientist (2009-2014)

Supported Academic Projects:

Project: Accelerated Insertion of Materials: Single-Crystal Ni-base Superalloy Turbine Blades

Funded by Air Force Research Laboratory
Air Force Research Laboratory (2007-2009)
Post-Doctoral Researcher

Project: Development of Automated Collection, Processing and Analysis Tools for Characterizing Microstructure

Funded by Air Force Research Laboratory
The Ohio State University, Columbus, OH (2003-2007)
Graduate Research Assistant

Project: Characterization and Modeling of High Strength Steel

Funded by Daimler-Chrysler
The Ohio State University, Columbus, OH (2002-2003)
Undergraduate Research Assistant

TEACHING AND ADVISING

Graduate Research Advisor

The Ohio State University (2018-Present)

Advising/Advised 8 Ph.D. and 14 M.S. students in areas of process optimization for additive manufacturing, ML-based prediction of materials failure, robotic path planning, autonomous robotic inspection

Purdue University (2015-2017)

Advised Post-doc and serving on Doctoral Committee for Ph.D. student in dynamic sampling of microstructure data

Johns Hopkins University (2013-2018)

Advising Post-doc and two Ph.D. students in modeling polycrystalline Ni-base superalloys and uncertainty quantification in microstructural quantification/representation.

University of California – Santa Barbara (2013-2017)

Advised Ph.D. student in quantitative microstructure characterization of polycrystalline Ni-base superalloys and organic matrix composites.

Wright State University (2011-2015)

Advised Ph.D. student in uncertainty and error modeling for quantitative microstructure characterization.

Carnegie Mellon University (2009-2012)

Advised and served on Doctoral Committee for Ph.D. student in modeling fatigue initiation in Ni-base superalloys for turbine disk applications.

Undergraduate Research Advisor

Wright State University (2013-2015)

Advised student in characterization and image analysis methods for quantifying critical microstructural features in single crystal Ni-base superalloy turbine blades.

University of Dayton (2011-2013)

Advised student in software development techniques for establishing automated digital microstructure quantification tools.

University of Dayton (2011)

Advised student in characterization and image analysis methods for quantifying critical microstructural features in single crystal Ni-base superalloy turbine blades.

University of Dayton (2008-2010)

Advised student in characterization and image analysis methods for quantifying critical microstructural features in single crystal Ni-base superalloy turbine blades.

Undergraduate and Graduate Courses

The Ohio State University, Columbus, OH (2019-Present)

Introduction to Manufacturing (ISE 2500)

Manufacturing Process Engineering (ISE 4500)

Manufacturing Data Analytics (ISE 5194)

Short Course Leader

Carnegie Mellon University Summer School, Pittsburgh, PA (2010-2019)

DREAM.3D Software Training Leader

Universite De Lorraine 3D Workshop, Metz, France (2013, 2015)

DREAM.3D Software Training Leader

Guest Lecturer

Johns Hopkins University, Baltimore, MD (2017)

Additive Manufacturing Graduate and Undergraduate Courses

Drexel University, Philadelphia, PA (2017)

Additive Manufacturing Undergraduate Course

Laboratory Leader and Recitation Teacher

The Ohio State University, Columbus, OH (2005-2006)

Graduate Teaching Assistant (4 Courses)

PUBLICATIONS

h-index: 27; i-10 index: 46; total citations: 3700+

Papers (50)

- 1) C.L. Xie, S. Ghosh, M. Groeber. Modeling Cyclic Deformation of HSLA Steels Using Crystal Plasticity, *J. Eng. Mater. Tech.*, 2004.
- 2) M. Uchic, M. Groeber, D. Dimiduk, and J. Simmons. "3D Microstructural Characterization of Nickel Superalloys via Serial-Sectioning Using a Dual Beam FIB-SEM" *Scripta Materialia*, July 2006.
- 3) M. Groeber, B. Haley, M. Uchic, D. Dimiduk, and S. Ghosh. "Towards 3D Reconstruction and Characterization of Polycrystalline Microstructures Using a FIB-SEM System" *Materials Characterization*, 57 (2006), 259-273.
- 4) S. Ghosh, Y. Bhandari, M. Groeber. "CAD-based reconstruction of 3D polycrystalline alloy microstructures from FIB generated serial sections" *CAD*, 40 (2008), 293-310.
- 5) Y. Bhandari, S. Sarkar, M. Groeber, M.D. Uchic, D.M. Dimiduk, S. Ghosh. "3D polycrystalline microstructure reconstruction from FIB generated serial sections for FE analysis" *Comp. Mater. Sci.*, 41 (2007), 222-235.
- 6) M. Groeber, M. Uchic, D. Dimiduk, and S. Ghosh. "A Framework for Automated Analysis and Simulation of 3D Polycrystalline Microstructures, Part 1: Statistical Characterization" *Acta Materialia*, 56 (2008), 1257-1273.

- 7) M. Groeber, M. Uchic, D. Dimiduk, and S. Ghosh. "A Framework for Automated Analysis and Simulation of 3D Polycrystalline Microstructures, Part 2: Synthetic Structure Generation" *Acta Materialia*, 56 (2008), 1274-1287.
- 8) M. Groeber, M. Uchic, D. Dimiduk, and S. Ghosh. "Development of a Robust 3D Characterization-Representation Framework for Modeling Polycrystalline Materials" *JOM*, Sept. 2007, 32-36.
- 9) M. Groeber, Y. Bhandari, M. Uchic, D. Dimiduk, and S. Ghosh. "A Framework for Automated 3D Microstructure Analysis and Representation" *JCAMD*, 14 (2007), 63-74.
- 10) K. Kirane, S. Ghosh, M. Groeber, and A. Bhattarjee. "Grain Level Dwell Fatigue Crack Nucleation Model for Ti Alloys Using Crystal Plasticity Finite Element Analysis" *J. Eng. Mater. Tech.*, 131 (2009), 1-14.
- 11) G. S. Rohrer, J. Li, S. Lee, A. D. Rollett, M. Groeber and M. Uchic. "Deriving the grain boundary character distribution and relative energies from three dimensional EBSD data" *Mater. Sci. and Tech.*, 26 (2010), 661-669.
- 12) M.A. Tschopp, M. Groeber, R. Fahringer, J. Simmons, A.H. Rosenberger, C. Woodward. "Automated extraction of symmetric microstructure features in serial sectioning images" *Materials Characterization*, 61 (2010), 1406-1417
- 13) M.A. Tschopp, M. Groeber, R. Fahringer, J. Simmons, A.H. Rosenberger, C. Woodward. "Symmetry-Based Automated Extraction of Microstructural Features: Application to Dendritic Cores in Single Crystal Ni-Based Superalloys" *Scripta Materialia*, 62 (2010), 357-360.
- 14) M.A. Tschopp, M. Groeber, R. Fahringer, J. Simmons, A.H. Rosenberger, C. Woodward. "Automated Detection and Characterization of Microstructural Features: Application to Eutectic Particles in Single Crystal Ni-based Superalloys." *MSMSE*, 18 (2010), 025014.
- 15) A.D. Rollett, R. Lebonsen, M. Groeber, Y.S. Choi. "Stress Hot Spots in Viscoplastic Deformation of Polycrystals" *MSMSE*, 18 (2010), 074005.
- 16) M. Uchic, M. Groeber, A.D. Rollett. "Automated Serial Sectioning Methods for Rapid Collection of 3-D Microstructure Data" *JOM*, 63 (2011), 25-29.
- 17) Y.S. Choi, M. Groeber, T.J. Turner, D. Dimiduk, C. Woodward, M. Uchic, T.A. Parthasarathy. "A Crystal Plasticity FEM Study on Effects of Simplified Grain Representation and Mesh Types on Mesoscopic Plasticity Heterogeneities" *Mat. Sci. and Eng. A*, 553 (2012), 37-44.
- 18) J. Thomas, M. Groeber, S. Ghosh. "Image-based Crystal Plasticity FE Framework for Microstructure Dependent Properties of Ti-6Al-4V Alloys", *Mat. Sci. and Eng. A*, 553 (2012), 164-175.
- 19) J. Tucker, L. Chan, G. Rohrer, M. Groeber, A.D. Rollett. "Comparison of Grain Size Distributions in a Ni-base Superalloy in Three and Two Dimensions Using the Saltykov Method" *Scripta Materialia*, 66 (2012), 554-557.
- 20) J. Tucker, L. Chan, G. Rohrer, M. Groeber, A.D. Rollett. "Tail Departure of Log-Normal Grain Size Distributions in Synthetic Three-Dimensional Microstructures" *Met. Trans.*, 43A (2012), 2810-2822.
- 21) T.J. Turner, P. Shade, J. Schuren, M. Groeber. "The Influence of Microstructure on Surface Strain Distributions in a Nickel Micro-Tension Specimen" *MSMSE*, 21 (2013), 015002.
- 22) S. Donegan, J. Tucker, A.D. Rollett, K. Barmak, M. Groeber. "Extreme Value Analysis of Tail Departure from Log-Normality in Experimental and Simulated Grain Size Distributions" *Acta Materialia*, 61 (2013), 5595-5604.
- 23) C. Szczepanski, P. Shade, M. Groeber, J. Larsen, S. Jha, R. Wheeler. "Development of a Microscale Fatigue Testing Technique" *AMP*, June (2013), 18-21.

- 24) P. Shade, M. Groeber, J. Schuren, M. Uchic. "Experimental Measurement of Surface Strains and Local Lattice Rotations Combined with 3D Microstructure Reconstruction from Deformed Polycrystalline Ensembles at the Micro-Scale", *Integrating Materials and Manufacturing Innovations*, 2:5 (2013).
- 25) G. Loughnane, M. Groeber, M. Uchic, M. Shah, R. Srinivasan, R. Grandhi. "Modeling the Effect of Voxel Resolution on the Accuracy of Phantom Grain Ensemble Statistics" *Materials Characterization*, 90 (2014), 136-150.
- 26) M. Jackson, M. Groeber, M. Uchic, D. Rowenhorst, M. DeGraef, "h5ebsd: an archival data format for electron back-scatter diffraction data sets", *Integrating Materials and Manufacturing Innovations*, 3:4 (2014).
- 27) M. Groeber and M. Jackson, "DREAM.3D: A Digital Representation Environment for the Analysis of Microstructure in 3D", *Integrating Materials and Manufacturing Innovations*, 3:5 (2014).
- 28) J. Tiley, A. Shiveley, A. Pilchak, P. Shade, M. Groeber, "3D Reconstruction of Prior Beta Grains in Friction Stir Processed Ti-6Al-4V", *Journal of Microscopy* 255 (2014), 71-77.
- 29) Y.S. Choi, M.A. Groeber, P.A. Shade, T.J. Turner, J.C. Schuren, D.M. Dimiduk, M.D. Uchic, A.D. Rollett. "Crystal Plasticity Finite Element Method Simulations for Polycrystalline Ni Micro-Specimen Deformed in Tension" *Met. Trans. A*, 45 (2014), 6352-6359.
- 30) D. Rowenhorst, A.D. Rollett, G.S. Rohrer, M. Groeber, M. Jackson, P.J. Konijnenberg, M. DeGraef. "Tutorial: Consistent Representations of and Conversions Between 3D Rotations", *MSMSE*, 23 (2015), 083501.
- 31) H. Sandgren, Y. Zhai, D. Lados, P. Shade, J. Schuren, M. Groeber, P. Kenesi. "Characterization of Fatigue Crack Growth Behavior in LENS fabricated Ti-6Al-4V Using High-Energy Synchrotron X-ray Microtomography", *Additive Manufacturing*, 12 (2016), 132-141.
- 32) P. Callahan, M. Groeber, M. DeGraef. "Towards a Quantitative Comparison Between Experimental and Synthetic Grain Structures", *Acta Mater*, 111 (2016), 242-252.
- 33) D. Godaliyadda, D. Ye, M. Uchic, M. Groeber, C. Bouman, "A Framework for Dynamic Image Sampling Based on Supervised Learning (SLADS)", *IEEE Trans. on Comp. Imaging*, (2017).
- 34) M. Diehl, M. Groeber, C. Hasse, D. Molodov, F. Roters and D. Raabe, "Identifying Structure-Property Relationships Through DREAM. 3D Representative Volume Elements and DAMASK Crystal Plasticity Simulations: An Integrated Computational Materials Engineering Approach", *JOM*, 69 (2017), 848-855.
- 35) Groeber, M. A., et al. "Application of characterization, modelling, and analytics towards understanding process-structure linkages in metallic 3D printing." *IOP Conference Series: Materials Science and Engineering*. Vol. 219. No. 1. IOP Publishing, 2017.
- 36) Groeber, Michael, et al. "A preview of the US air force research laboratory additive manufacturing modeling challenge series." *JOM* 70.4 (2018): 441-444.
- 37) E. Schwalbach S. Donegan, M. Chapman, K. Chaput and M. Groeber, "An Analytical approach to Predict Thermal History Produced by Complex Moving Heat Sources", *Additive Manufacturing*, 25, (2019), 485-498.
- 38) S. Donegan, N. Kumar and M. Groeber, "Associating local microstructure with predicted thermally-induced stress hotspots using convolutional neural networks", *Materials Characterization*, 158, (2019)
- 39) S. Donegan, E. Schwalbach, and M. Groeber, "Zoning additive manufacturing process histories using unsupervised machine learning" *Materials Characterization*, 161, (2020).
- 40) S. Srinivasan, B. Swick, and M. Groeber, "Laser Powder Bed Fusion Parameter Selection Via Machine Learning Augmented Process Modeling" *JOM*, 72, (2020).
- 41) J. Rossin, B. Goodlet, C. Torbet, W. Musinski, M. Cox, J. Miller, M. Groeber, A. Mayes, E. Biedermann, S. Smith, S. Daly, T. Pollock, "Assessment of grain structure evolution with resonant ultrasound spectroscopy in additively manufactured nickel alloys" *Materials Characterization*, 167, (2020).

- 42) Srinivasan, Sandeep, Brennan Swick, and Michael A. Groeber. "Laser Powder Bed Fusion Parameter Selection via Machine-Learning-Augmented Process Modeling." *JOM* 72.12 (2020): 4393-4403.
- 43) Zukić, Dženan, et al. "ITKMontage: A Software Module for Image Stitching." *Integrating Materials and Manufacturing Innovation* 10.1 (2021): 115-124.
- 44) Wang, Long, Theodore T. Allen, and Michael A. Groeber. "Tabu efficient global optimization with applications in additive manufacturing." *Structural and Multidisciplinary Optimization* 63.6 (2021): 2811-2833.
- 45) M. Cox, E. Schwalbach, B. Blaiszik, and M. Groeber, "AFRL Additive Manufacturing Modeling Challenge Series: Overview." *Integrating Materials and Manufacturing Innovation* (2021).
- 46) E. Schwalbach, M. Chapmen, and M. Groeber, "AFRL Additive Manufacturing Modeling Challenge Series: Challenge 2, Microscale Process-to-Structure Data Description." *Integrating Materials and Manufacturing Innovation* (2021).
- 47) Banerjee, Arunima, Sara Messina, Matthew R. Begley, Edwin J. Schwalbach, Michael A. Groeber, William D. Musinski, Paul A. Shade, Marie E. Cox, Jonathan D. Miller, and Kevin J. Hemker. "The mechanical response of additively manufactured IN625 thin-walled structures." *Scripta Materialia* 205 (2021).
- 48) O'Loughlin, Sean, Benjamin Dutton, Gent Semaj, Eric Snell, Jacob Rindler, and Michael A. Groeber. "Towards In-process Prediction of Voids in Laser Powder Bed Fusion." *JOM* 73, no. 11 (2021): 3240-3249.
- 49) Donegan, Sean P., Edwin J. Schwalbach, and Michael A. Groeber. "Multimodal Registration and Fusion of In Situ and Ex Situ Metal Additive Manufacturing Data." *JOM* 73, no. 11 (2021): 3250-3262.
- 50) Chuang, Andrew C., Jun-Sang Park, Paul A. Shade, Edwin J. Schwalbach, Michael A. Groeber, and William D. Musinski. "AFRL Additive Manufacturing Modeling Series: Challenge 1, Characterization of Residual Strain Distribution in Additively-Manufactured Metal Parts Using Energy-Dispersive Diffraction." *Integrating Materials and Manufacturing Innovation* 10, no. 4 (2021): 525-541.

Book Chapters (5)

- 1) M. Groeber, D. Rowenhorst, and M. Uchic. "Chapter 9: Collection, Processing, and Analysis of Three-Dimensional EBSD Data Sets" *Electronic Backscatter Diffraction in Materials Science*, 2nd Edition, Springer (2009).
- 2) S. Sintay, M. Groeber, and A. Rollett. "Chapter 10: 3D Reconstruction of Digital Microstructures" *Electronic Backscatter Diffraction in Materials Science*, 2nd Edition, Springer (2009).
- 3) M. Groeber. "Chapter 3: Digital Representation of Materials Grain Structure" *Computational Methods for Microstructure-Property Relationships*, Springer (2009).
- 4) S. Ghosh and M. Groeber, "Developing virtual microstructures and statistically equivalent representative volume elements for polycrystalline materials" *Handbook of Materials Modeling: Methods: Theory and Modeling*, Springer (2020).
- 5) S. Donegan and M. Groeber, "Data Structures and Workflows for ICME" *Integrated Computational Materials Engineering (ICME)*, Springer (2020).

CONFERENCE PRESENTATIONS AND WORKSHOPS

Key Conference/Workshop Presentations (46)

- 1) M. Groeber, B. Haley, M. Uchic, D. Dimiduk and S. Ghosh, "Microstructural Characterization Using 3-D Orientation Data Collected by an Automated FIB-EBSD System", *Numiform*, Columbus, OH, USA, June, 2004.

- 2) M. Groeber, B. Haley, M. Uchic, D. Dimiduk and S. Ghosh, "Microstructural Characterization Using 3-D Orientation Data Collected by an Automated FIB-EBSD System", *ASM*, Columbus, OH, USA, October, 2004.
- 3) M. Groeber, Y. Bhandari, M. Uchic, D. Dimiduk and S. Ghosh, "Advances in computational modeling through the use of higher-level microstructure characterization", *Materials Characterization*, Portland, ME, USA, November, 2005.
- 4) M. Groeber, Y. Bhandari, M. Uchic, D. Dimiduk and S. Ghosh, "Reconstruction and Characterization of 3D Microstructures: An Unbiased Description of Grain Morphology", *TMS*, San Antonio, TX, USA, March, 2006.
- 5) M. Groeber, Y. Bhandari, M. Uchic, D. Dimiduk and S. Ghosh, "An Automated Framework for Microstructure Characterization and Representation", *Multiscale Materials Modeling*, Freiburg, Germany, September, 2006. (INVITED)
- 6) M. Groeber, M. Uchic, D. Dimiduk and S. Ghosh, "An Automated Framework for Microstructure Characterization and Representation, Part 1: Characterization", *TMS*, Orlando, FL, USA, February, 2007.
- 7) M. Groeber, M. Uchic, D. Dimiduk and S. Ghosh, "An Automated Framework for Microstructure Characterization and Representation, Part 2: Modeling", *TMS*, Orlando, FL, USA, February, 2007. (INVITED)
- 8) M. Groeber, M. Uchic, D. Dimiduk and S. Ghosh, "Towards the Incorporation of Realistic Microstructures in Computational Models: A Framework for Automated 3D Microstructure Analysis and Representation", *TMS*, New Orleans, LA, USA, March, 2008. (INVITED)
- 9) M. Groeber, M. Uchic, D. Dimiduk and S. Ghosh, "Development of a Methodology for Predicting 3D Structure from 2D Observations", *TMS*, New Orleans, LA, USA, March, 2008.
- 10) M. Groeber, M. Uchic, D. Dimiduk and S. Ghosh, "An Automated Framework for Incorporation of Realistic Microstructures in Computational Models", *ECCOMAS*, Venice, Italy, July, 2008
- 11) M. Groeber, R. Fahringer, M. Tschopp, C. Woodward, D. Dimiduk, M. Uchic and A. Rosenberger, "Integration of 3D Structure Information for a Single X-tal Ni-Base Superalloy into Computational Models for Behavior Prediction", *TMS*, San Francisco, CA, USA, February, 2009. (INVITED)
- 12) M. Groeber, R. Fahringer, M. Tschopp, C. Woodward, D. Dimiduk, M. Uchic and A. Rosenberger, "Integration of the 3D Structure of a Single X-tal Ni-Base Superalloy within a Computational Modeling Framework", *USNCCM-10*, Columbus, OH, USA, July, 2009. (INVITED)
- 13) M. Groeber, "Quality Metrics for Digital Representation of Grain Structure: Assessing the Current State of Virtual Materials Structure", *USNCCM-10*, Columbus, OH, USA, July, 2009.
- 14) M. Groeber, "Obtaining and Using 3D Material Structure Information: Collection Techniques and Analysis Strategies", *Monash University Seminar*, Melbourne, Australia, September, 2009. (INVITED)
- 15) M. Groeber, M. Uchic, P. Shade, Y.S. Choi, D. Dimiduk and R. Wheeler, "Microstructure Effects on Local Plasticity: A Method for Closing the Validation Loop Between Experiment and Simulation", *Plasticity '10*, St. Kitts, January, 2010.
- 16) M. Groeber, M. Uchic, P. Shade, Y.S. Choi and D. Dimiduk, "Microstructure Effects on Local Plasticity: A Method for Closing the Validation Loop Between Experiment and Simulation", *TMS*, San Diego, CA, March, 2011.

- 17) M. Groeber, R. Fahringer, M. Tschopp, A. Shiveley, D. Dimiduk, M. Uchic and C. Woodward, "Multi-Scale Characterization of the 3D Structure of a Single X-tal Ni-Base Superalloy Turbine Blade", *TMS*, Seattle, WA, March, 2011.
- 18) M. Groeber, J. Simmons, C. Przybyla, A.D. Rollett and M. Comer, "Addressing Extreme Values in Synthetic Microstructure Builders", *TMS*, Seattle, WA, March, 2011.
- 19) M. Groeber, M. Shah and M. Uchic, "Development of Autonomous, Multi-Modal 3D Characterization Systems", *AFOSR-ANFF Workshop*, Washington, DC, May, 2012. (INVITED)
- 20) M. Groeber, "The State of 3D Synthetic Microstructure Generation and Its Potentially Novel Applications", *3D Materials Science*, Seven Springs, PA, July, 2012. (INVITED)
- 21) M. Groeber, M. Uchic, P. Shade, Y.S. Choi and D. Dimiduk, "Microstructure Effects on Local Plasticity: Efforts to Link Experiment and Simulation", *TMS*, San Antonio, TX, March, 2013. (INVITED)
- 22) M. Groeber and M. Jackson, "DREAM.3D: Digital Representation Environment for Analysis of Microstructure in 3D", *TMS*, San Antonio, TX, March, 2013. (INVITED)
- 23) M. Groeber and M. Jackson, "DREAM.3D: Digital Representation Environment for Analysis of Microstructure in 3D", *APS User's Meeting*, Argonne National Laboratory, IL, May, 2013. (INVITED)
- 24) M. Groeber, "Towards Automated 3D Microstructure Collection and Analysis: Ready for the Age of Computational Material Science", *LEM3 3D Materials Science Workshop*, Metz, France, June, 2013. (INVITED)
- 25) M. Groeber and M. Jackson, "DREAM.3D: Digital Representation Environment for Analysis of Microstructure in 3D", *3D Materials Science*, Annecy, France, July, 2014. (INVITED)
- 26) M. Groeber, S. Donegan and M. Jackson, "SIMPL & DREAM.3D: Managing Digital Materials Data", *MGI Data Workshop*, Dayton, OH, July, 2014. (INVITED)
- 27) M. Groeber, "Towards Automated 3D Microstructure Collection and Analysis: Ready for the Age of Computational Material Science", *Purdue University MSE Dept. Seminar*, West Lafayette, IN, October, 2014. (INVITED)
- 28) M. Groeber, S. Donegan and M. Jackson, "SIMPL & DREAM.3D: Managing Digital Materials Data", *NSRC Big Data and Analytics Workshop*, Oak Ridge, TN, April, 2015.
- 29) M. Groeber, "The State of 3D Synthetic Microstructure Generation and Its Potentially Novel Applications", *NSF Big Data in Materials Workshop*, Santa Barbara, CA, May, 2015. (INVITED)
- 30) M. Groeber, E. Schwalbach, S. Donegan and J. Miller, "Correlating Defects with Powder Bed Additive Manufacturing Process Conditions", *3D Materials Science*, St. Charles, IL, July, 2016.
- 31) M. Groeber, A. Lewis and A. Sayir, "Materials Avatars: A Vision for Digital Description of Materials", *Materials Avatars*, Washington D.C., July, 2016. (ORGANIZER)
- 32) M. Groeber, E. Schwalbach, S. Donegan, P. Shade, B. Musinski and J. Miller, "Microstructurally Informed Data Driven Design for Additive Structures (MIDAS)", *4th International Congress on ICME*, Ypsilanti, MI, May, 2017.
- 33) M. Groeber, E. Schwalbach, S. Donegan, K. Chaput, T. Butler, P. Shade, B. Musinski and J. Miller, "Application of Characterization, Modeling and Analytics Towards Understanding Process-Structure-Property Relationships in Metallic Additive Manufacturing", *Gordon Research Conference*, Biddeford, ME, July, 2017 (INVITED).
- 34) M. Groeber, E. Schwalbach, S. Donegan, K. Chaput, T. Butler, P. Shade, B. Musinski and J. Miller, "Application of Characterization, Modeling and Analytics Towards Understanding Process-

- Structure-Property Relationships in Metallic Additive Manufacturing”, *Riso International Symposium on Materials Science*, Roskilde, Denmark, September, 2017 (INVITED).
- 35) M. Groeber, E. Schwalbach, S. Donegan, K. Chaput, T. Butler, P. Shade, B. Musinski and J. Miller, “Application of Characterization, Modeling and Analytics Towards Understanding Process-Structure-Property Relationships in Metallic Additive Manufacturing”, *Drexel University Materials Science Department Seminar*, Philadelphia, PA, October, 2017 (INVITED).
- 36) M. Groeber, E. Schwalbach, S. Donegan, K. Chaput, T. Butler, P. Shade, B. Musinski and J. Miller, “Application of Characterization, Modeling and Analytics Towards Understanding Process-Structure-Property Relationships in Metallic Additive Manufacturing”, *Johns Hopkins University Mechanical Engineering Department Seminar*, Baltimore, MD, October, 2017 (INVITED).
- 37) M. Groeber, E. Schwalbach, S. Donegan, K. Chaput, T. Butler, P. Shade, B. Musinski and J. Miller, “Application of Characterization, Modeling and Analytics Towards Understanding Process-Structure-Property Relationships in Metallic Additive Manufacturing”, *International Congress on 3D Materials Science*, Helsingor, Denmark, July, 2018. (INVITED)
- 38) M. Groeber, E. Schwalbach, S. Donegan, K. Chaput, and J. Miller, “Incorporating Material Heterogeneity in Automated Design Tools”, *TMS Annual Meeting*, Phoenix, AZ, March, 2018.
- 39) M. Groeber, E. Schwalbach, S. Donegan, and B. Swick, “Data Analytics and Modeling for Optimization of Additive Manufacturing”, *19th Polish-American Conference on Science and Technology*, Columbus, OH, April, 2019. (INVITED)
- 40) M. Groeber, E. Schwalbach, S. Donegan, K. Chaput, and B. Swick, “Combining Modeling, Monitoring and Characterization for Process Control and Optimization”, *NSF Workshop on Machine Learning in Mechanics of Materials*, Washington, DC, November, 2019. (INVITED)
- 41) M. Groeber, E. Schwalbach, S. Donegan, K. Chaput, and B. Swick, “Opportunities for Machine Learning in Advanced Manufacturing and Inspection”, *NSF Workshop on Materials Data Analytics*, Santa Barbara, CA, February, 2020. (INVITED)
- 42) M. Groeber, K. Giriprasad, B. Swick, E. Schwalbach, and S. Donegan, “Training Data-driven Machine Learning Models Using Physics Simulations”, *TMS Annual Meeting*, San Diego, CA, February, 2020. (INVITED)
- 43) M. Groeber, “Integrating Robotics and Artificial Intelligence (for Manufacturing): Potential Impacts on Healthcare Supply Chains”, *Robotics Engineered for the Future of Healthcare Symposium*, April, 2021. (INVITED)
- 44) M. Groeber, “An Overwhelmingly Fast Look at the Complexity (and Potential) of Metallic 3D Printing”, *National Defence University Additive Manufacturing Course*, April, 2021. (INVITED)
- 45) M. Groeber, S. Niezgod, G. Daehn, W. Hansen, A. Buynak, A. Exley, T. Mahan, B. Swick, “Automation (In Dynamic and Uncertain Manufacturing Environments): Needs for & Challenges to Autonomous Manufacturing Systems”, *NSF-AFRL Autonomous Research and Development Workshop*, April, 2022. (INVITED)
- 46) M. Groeber, E. Schwalbach, S. Donegan, M. Krug, “Zoning Processing Spaces for Additive Manufacturing: Applications for Inverse Design”, *FAA-EASA Workshop on Additive Manufacturing Qualification and Certification*, October, 2022. (INVITED)

Short Courses (9)

- 1) M. Groeber and M. Jackson. "DREAM.3D - Digital Representation Environment for the Analysis of Microstructure in 3D", Carnegie Mellon University Summer School, Pittsburgh, PA, 2010.
- 2) M. Groeber and M. Jackson. "DREAM.3D - Digital Representation Environment for the Analysis of Microstructure in 3D", Carnegie Mellon University Summer School, Pittsburgh, PA, 2011.

- 3) M. Groeber and M. Jackson. "DREAM.3D - Digital Representation Environment for the Analysis of Microstructure in 3D", Carnegie Mellon University Summer School, Pittsburgh, PA, 2012.
 - 4) M. Groeber and M. Jackson. "DREAM.3D - Digital Representation Environment for the Analysis of Microstructure in 3D", Carnegie Mellon University Summer School, Pittsburgh, PA, 2013.
 - 5) M. Groeber, S. Donegan and M. Jackson. "DREAM.3D - Digital Representation Environment for the Analysis of Microstructure in 3D", Carnegie Mellon University Summer School, Pittsburgh, PA, 2014.
 - 6) M. Groeber, S. Donegan and M. Jackson. "DREAM.3D - Digital Representation Environment for the Analysis of Microstructure in 3D", Carnegie Mellon University Summer School, Pittsburgh, PA, 2015.
 - 7) M. Groeber and S. Donegan. "DREAM.3D - Digital Representation Environment for the Analysis of Microstructure in 3D", TMS-Carnegie Mellon University Summer School, St. Charles, IL, 2016.
 - 8) M. Groeber and M. Jackson. "DREAM.3D - Digital Representation Environment for the Analysis of Microstructure in 3D", Universite De Lorraine, Metz, France, 2013.
 - 9) M. Groeber and S. Donegan. "DREAM.3D - Digital Representation Environment for the Analysis of Microstructure in 3D", Universite De Lorraine, Metz, France, 2015.
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AWARDS

- Editor's Choice Award for Top Article in JOM (2020)
 - Director's Award of Air Force Research Laboratory (2015)
Given annually to 1 research scientist that Laboratory Director selects as having demonstrated significant impact to the lab
 - Air Force Research Laboratory Early Career Achievement Award (2013)
Given to 2-4 recipients annually across AFRL. Carries 3 year, \$450K grant for exemplary research.
 - Scientific Advisory Board Best Poster Award (2015)
Given at SAB review (every four years) to poster that exhibits exemplary research
 - First Prize in the Hayes Graduate Research Forum for Outstanding Research in Engineering at Ohio State University (2006)
Given annually to graduate student demonstrating the most excellent research across all engineering.
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PROFESSIONAL AFFILIATIONS

- Associate Editor for JOM
- Chair of Advanced Characterization, Testing and Simulation Committee of TMS
- Member of Materials Innovation Committee of TMS (Invite Only)
- Member of ICME Committee of TMS
- Lead Organizer of International Conference on 3D Materials Science (2016)
- Guest Editor for Special Edition of Integrating Materials and Manufacturing Innovation Journal on 3D Materials Science
- Reviewer for Modeling and Simulation in Material Science and Engineering Journal (MSMSE)
- Reviewer for Integrating Materials and Manufacturing Innovation Journal (IMMI)
- Reviewer for Journal of Materials (JOM)
- Reviewer for Materials Characterization Journal
- Reviewer for Metallurgical Transactions A
- Reviewer for Scripta Materialia
- Reviewer for Computational Imaging Journal