Stephen R. Niezgoda

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Education

Ph.D. in Materials Science and Engineering, Drexel University, 2010.

B.S. in Materials Science and Engineering, Drexel University, 2006.

F.A.A. Certification Airframe & Powerplant Mechanic, New Jersey Academy of Aviation Science, 2001.

Employment

Associate Professor
Department of Materials Science and Engineering
Department of Mechanical and Aerospace Engineering
The Ohio State University Starting June 2019

Assistant Professor
Department of Materials Science and Engineering
Department of Mechanical and Aerospace Engineering
The Ohio State University August 2013–June 2019

Visiting Faculty
Materials and Manufacturing Directorate
Air Force Research Laboratory Summer 2017 & 2018.

Technical Consultant and Research & Development Strategist
Clients

MRL Materials Resources, 2009–Present.

Post-doctoral Researcher
MST-8 Materials Science in Radiation and Dynamic Extremes
Materials Science and Technology Division, *Los Alamos National Laboratory*
SMaRTS Neutron Diffraction Team July 2012–July 2013.
Mechanical Modeling Team July 2010–July 2012.

Adjunct Lecturer
Materials Science and Engineering Dept., *Drexel University*, 2010 Academic Year.

Co-op Production Engineer
Pratt and Whitney
Turbine Module Center, Thermal Barrier Coatings, 2006–2007.

Aircraft Airframe & Powerplant Mechanic
Witmer's Aircraft Service, 2001–2003.

Funding History

Research Programs

GOALI: Localized Phase Transformations (LPT) strengthening for next-generation superalloys
M.J. Mills (PI)& S.R. Niezgoda (Co-PI)& M. Ghazisaeidi & Y. Wang (Co-PI)
Sponsor: National Science Foundation
Award Amount: $1,383,492
*Period of Performance:*10/01/2019 - 09/30/2023

STTR: Data analytics & machine learning to accelerate materials design and processing development

S.R. Niezgoda (PI)
Sponsor: Office of Naval Research subcontract through Akadi0
Award Amount: $42,000
*Period of Performance:*09/25/2018 - 12/31/2020

STTR: Analysis of dislocation density, recrystallization, and residual stress in 5xxx aluminum using laser peening to mi

S.R. Niezgoda (PI)
Sponsor: Office of Naval Research subcontract through Hepburn and Sons LLC
Award Amount: $164,000
*Period of Performance:*09/25/2018 - 12/31/2020

(Prediction) Precision measurement tools for advanced materials characterization
M.J. Mills (PI) & S.R. Niezgoda (PI)
Sponsor: Air Force Research Labs
Award Amount: $96,000
*Period of Performance:*06/01/2018 - 05/31/2019

QRM: Hybrid adversarial-training methods for 3D virtual microstructures
S.R. Niezgoda (PI) & D. Dimiduk (Co-PI)& Y. Wang (Co-PI)
Sponsor: National Science Foundation
Award Amount: $492,026
*Period of Performance:*09/01/2018 - 08/31/2022

ICME for Advanced Manufacturing
S.R. Niezgoda (PI) & Y. Wang (Co-PI)
Sponsor: Office of Naval Research Subcontract through Det Norske Veritas
Award Amount: $250,000
*Period of Performance:*10/01/2018 - 09/30/2020

Ensemble Predictions of Material Behavior for ICMSE for Additive Structures
S.R. Niezgoda (PI) & H.L. Fraser (Co-PI)
Sponsor: Air Force Research Laboratory
Award Amount: $500,000
Period of Performance: 07/01/2017 - 06/30/2020

Texture Evolution and Softening During Discontinuous Dynamic Recrystallization
S.R. Niezgoda (PI) & Y. Wang (Co-PI)
Sponsor: National Science Foundation, Division of Civil, Mechanical, and Manufacturing Innovation, Mechanics of Materials and Structure Program
Award Amount: $415,843
Period of Performance: 08/01/2017 - 07/31/2020

Uncertainty Quantification for Model Selection
S.R. Niezgoda (PI) & O. Chkrebtii (Co-PI)

Sponsor: Seed Funding from Center for Emergent Materials a National Science Foundation Materials Research Science and Engineering Center (MRSEC)
Award Amount: $65,000
Period of Performance: 09/01/2016 - 08/31/2018

ICME for Creep of Ni-base Superalloys in Advanced Ultra-Supercritical Steam Turbines
S.R. Niezgoda (PI) & Y. Wang (Co-PI)
Sponsor: U.S. Department of Energy, National Energy Technology Laboratory)
Award Amount: $400,000
Period of Performance: 09/01/2016 - 08/31/2019

Probabilistic Multi-Scale Clustering of EBSD Data for Prior Austenite Grain Reconstruction
S.R. Niezgoda (PI)
Sponsor: Air Force Research Laboratory
Award Amount: $150,000
Period of Performance: 07/01/2016 - 12/30/2018

Computational Design Tools for Quantifying Uncertainty Due to Material Variability
S.R. Niezgoda (PI)
Sponsor: U.S. Department of Defense, Defense Advanced Research Projects Agency (DARPA)
Award Amount: $325,214
Period of Performance: 09/15/2015 - 09/14/2018

Mechanistic and Microstructure-Based Design Approach for Rapid Prototyping of Superalloys
M.J. Mills (PI) & S.R. Niezgoda, Y. Wang, M. Ghazisaeidi (CoPIs)
Sponsor: National Science Foundation, Division of Materials Research, Designing Materials to Revolutionize and Engineer our Future Program
Award Amount: $1,467,429
Period of Performance: 10/01/2015 - 09/30/2019

Integration of ICME with legacy & novel TMP processing for assured properties in large titanium structures
H.L. Fraser (PI) & S.R. Niezgoda, Y. Wang, W. Zhang (CoPIs), with subcontracts to Special Forming Technology, EWI, Purdue University, University of North Texas, and Southwest Research Institute
Sponsor: American Light Metals Manufacturing Institute (ALMII) DBA Lightweight Innovations for Tomorrow, A public/private manufacturing institute funded through U.S. Office of Naval Research
Award Amount: $3,200,000 (total) including $2,787,500 from sponsor and $412,500 cost-share
Period of Performance: 10/08/2015 to 03/31/2018
Note: Project was terminated early, 8/23/2017, due to financial status of ALMII/LIFT. Total funds received from sponsor $1,945,827

Equipment and Research Instrumentation

Acquisition of a state-of-the-art scanning electron microscope for advanced materials research and education
T. Grassman (PI) & S.R. Niezgoda, H. Powell, and D. McComb (CoPIs)
Sponsor: National Science Foundation, Major Research Instrumentation
Award Amount: $990,000 including $800,000 from sponsor and $190,000 cost-share
Award Date: 09/01/2017
Description: Funds for the purchase of a scanning electron microscope for the Center for Electron Microscopy and Analysis at OSU

Development of a Dynamic Material Processing and Testing Instrument (Fabricated Equipment)
G.S. Daehn (PI) & S.R. Niezgoda, J.C. Lippold (CoPIs)
Sponsor: National Science Foundation, Major Research Instrumentation
Award Amount: $400,000 including $354,000 from sponsor and $46,000 cost-share
Award Date: 08/15/2015
Description: Funds for the development and fabrication of a high deformation rate materials testing and manufacturing platform based on vaporizing foil actuator technology

Professional Training Programs

Renewing magnet school activities at OSU through senior design research and student FIA site visits

S.R. Niezgoda (Pi)
Sponsor: Forging Industry Education and Research Foundation
Award Amount: $10,000
Period of Performance: 08/01/2018 - 12/31/2019
Description: Funds to support OSU students for senior design activities and to visit Forging Industry Association member sites

Forming and Manufacture of Lightweight High-Performance Components

K. Srinivasan (PI) & G.S. Daehn, S.R. Niezgoda (CoPIs)
Sponsor: National Science Foundation, Office of International Engineering, International Research Experiences for Students Program
Award Amount: $249,974
Period of Performance: 06/01/2017 to 04/20/2020 (estimated)
Description: Funds to support OSU students to spend summer at Technical University Dortmund to study metal forming and advanced manufacturing techniques. Includes German language training.

Teaching and Advising

Courses Taught

The Ohio State University

MSE5441 Advanced Physical Metallurgy: 2017-2019
Senior Undergraduate and Graduate Level Physical Metallurgy of Ferrous and NonFerrous Alloys

MSE6765 Mechanical Behavior of Materials: 2013-2018
Graduate Level Solid Mechanics/Mechanics of Materials Course

MSE5431 Advanced Metals Laboratory: 2013-2016
Senior Level Elective Laboratory Course

MSE4321 Modeling and Simulation Based Design: 2013-2017
Senior Level Computational Materials Laboratory Course, Co-Instructed w/ W. Windl

MSE3321 Modeling and Simulation Lab II: 2013-2015
Junior Level Computational Materials Laboratory Course, Co-Instructed w/ P. Anderson and (W. Windl or M. Ghaziesaidi)

Drexel University

MATE 580/MATE 610 Mechanical Behavior of Solids
Graduate Level Solid Mechanics Course, Fall/Spring 2010

Student and Postdoctoral Advised

Postdoctoral Researchers

Pengyang Zhao, 2016-2018, jointly advised and funded with Yunzhi Wang

Ph.D. Students

Alexander Brust, Graduated May 2019, *Applications of Graph Cutting for Probabilistic Characterization of Microstructures in Ferrous Alloys*

Mengfei Yuan, Graduated May 2019, *Machine Learning-Based Reduced-Order Modeling and Uncertainty Quantification for Structure-Property Relations in ICME Applications*

Katelun Wertz, Graduated May 2019, Jointly advised by Michael Mills (primary) *Exploration of Phase Stability and Hot Workability of Polycrystalline Co-Al-W-Base Superalloys*

Thaddeus Song En Low, May 2018, *Metastability of High Pressure Phases in Shocked Zirconium: Experiment and Modeling*

Michael Gibbons, Graduated May 2016, Jointly advised by Wolfgang Windl (primary), *Continuum-Scale Modeling of Shear Banding in Bulk Metallic Glass-Matrix Composites*

Pengyang Zhao, Graduated May 2015, Jointly advised by Yunzhi Wang (primary), *Mesoscale modeling of mechanical deformation of metallic glasses*

Currently Advising:

Advising 5 Ph.D. students as sole advisor - 2 post candidacy

Co-Advising 1 Ph.D student as secondary advisor

Masters Students

Nicholas Galbincea, Graduated May 2017, *Critical Analysis of Dimensionality Reduction Techniques and Statistical Microstructural Descriptors for Mesoscale Variability Quantification*

Bachelors with Research Distinction

Carl Ahlborg, Graduatied May 2018, *Mixture Models for the Representation of Crystallographic Texture*

Eric Magnuson, Graduated May 2016, *Representation of Crystallographic Texture using the Symmetric Bingham Distribution*

Publications

Statistics

Peer Review Archival Publications: 51

H-Index

Google Scholar: 21

I10 index: 31

Citations

Google Scholar: 1980

Refereed Journal Publications

1. A.F. Brust, E.J. Payton, V. Sinha, V.A. Yardley, S.R. Niezgoda. "Characterization of Martensite Orientation Relationships in Steels and Ferrous Alloys from EBSD Data Using Bayesian Inference." *Metallurgical and Materials Transactions A* **51** 1-12 (2019)

2. D.E. Ricciardi, O.A. Chkrebtii, S.R. Niezgoda. "Uncertainty Quantification for Parameter Estimation and Response Prediction." *Integrating Materials and Manufacturing Innovation* **8** 273-293 (2019)

3. A.F. Brust, E.J. Payton, T.J. Hobbs, S.R. Niezgoda. "Application of the Maximum Flow–Minimum Cut Algorithm to Segmentation and Clustering of Materials Datasets." *Microscopy and Microanalysis* **25** 1-18 (2019)

4. P. Zhao, C. Shen, M.F. Savage, J. Li, S.R. Niezgoda, M.J. Mills, Y. Wang. "Slip transmission assisted by Shockley partials across α/β interfaces in Ti-alloys." *Acta Materialia* **171** 291-205 (2019)

5. I. Chelladurai, D. Adams, D.T. Fullwood, M.P. Miles, S.R. Niezgoda, I.J. Beyerlein, M. Knezevic. "Modeling of trans-grain twin transmission in AZ31 via a neighborhood-based viscoplastic self-consistent model." *International Journal of Plasticity* **117** 21-32 (2019)

6. A.F. Brust, S.R. Niezgoda, V.A. Yardley, E.J. Payton. "Analysis of misorientation relationships between austenite parents and twins." *Metallurgical and Materials Transactions A* **50** 837-855 (2019).

7. M.M.A. Rafique, S.R. Niezgoda, M. Brandt, "Development of Bulk Metallic Glass Matrix Composites (BMGMC) by Additive Manufacturing: Modelling and Simulation–A Review: Part B." *Advanced Materials Research* **1154** 40-79 (2019)

8. M.M.A. Rafique, S.R. Niezgoda, M. Brandt, "Development of Bulk Metallic Glass Matrix Composites (BMGMC) by Additive Manufacturing: Modelling and Simulation–A Review: Part A." *Advanced Materials Research* **1154** 1-39 (2019)

9. P. Zhao, C. Shen, M.F.Savage, J. Li, S.R. Niezgoda, M.J. Mills, Y. Wang " Slip transmission assisted by Shockley partials across α/β interfaces in Ti-alloys" *Acta Materialia* **171** 291-205 (2019)

10. A.F. Brust, S.R. Niezgoda, V.A. Yardley, E.J. Payton " Analysis of Misorientation Relationships Between Austenite Parents and Twins" *Metallurgical and Materials Transactions A* **50** 837-855 (2019)

11. M. Yuan, S. Paradiso, B. Meredig, S.R. Niezgoda " Machine Learning–Based Reduce Order Crystal Plasticity Modeling for ICME Applications" *Integrating Materials and Manufacturing Innovation* **7** 214-230 (2018)

12. P.zhao, M.J.Mills, Y. Wang, S.R.Niezgoda " A homogenized primary creep model of nickel-base superalloys and its application to determining micro-mechanistic characteristics" *International Journal of Plasticity* **110** 202-2019 (2018)

13. C.E.Slone, S.Chakraborty, J.Miao, E.P.George, M.J.Mills, S.R.Niezgoda " Influence of deformation induced nanoscale twinning and FCC-HCP transformation on hardening and texture development in medium-entropy CrCoNi alloy" *Acta Materialia* **158** 38-52 (2018)

14. P. Zhao, C. Shen, S.R. Niezgoda, Y. Wang " Heterogeneous γ' microstructures in nickel-base superalloys and their influence on tensile and creep performance" *International Journal of Plasticity* **109** 153-168 (2018)

15. D. Dimiduk, E.A. Holm, S.R. Niezgoda. " Perspectives on the Impact of Machine Learning, Deep Learning, and Artificial Intelligence on Materials, Processes, and Structures Engineering" *Integrating Materials and Manufacturing Innovation* **7** 157-172 (2018)

16. T.S.E. Low, S.R. Niezgoda. " Modeling the α/ω thermal stability in shocked Zr: A coupling between dislocation removal and phase transformation" *Acta Materialia* **156** 104-115 (2018)

17. I.Chelladurai, D. Adams, D.T. Fullwood, M.P. Miles, S.R. Niezgoda, I.J. Beyerlein, I.J., M. Knezevic "Modeling of trans-grain twin transmission in AZ31 via a neighborhood-based viscoplastic self-consistent model" *International Journal of Plasticity* (2018).

18. P. Zhao, Y. Wang, S.R. Niezgoda. " Microstructural and micromechanical evolution during dynamic recrystallization" *International Journal of Plasticity* **100** 52-68 (2018)

19. J. Kuang, T.S.E. Low, S.R. Niezgoda, X Li, Y Geng, G. Tang, A. Luo. "Abnormal Texture Development in Magnesium Alloy Mg-3Al-1Zn during Large Strain Electroplastic Rolling: Effect of Pulsed Electric Current" *International Journal of Plasticity* **87** 86-99 (2016).

20. D.M. Turner, S.R. Niezgoda, S.R. Kalidindi. "Efficient computation of the angularly resolved chord length distributions and lineal path functions in large microstructure datasets" *Modelling and Simulation in Materials Science and Engineering* **24** 075002 (2016).

21. A. Hunter, A.P. Vicente, O. Restrepo, M. Gibbons, W. Windl, S.R. Niezgoda, K. Flores, D. Hofmann, E. Marquis. "Three dimensional imaging of shear bands in bulk metallic glass composites" *Journal of Microscopy* **49** 1315-1319 (2016).

22. S.R. Niezgoda, E.A. Magnuson, J. Glover, "Symmetrized Bingham distribution for representing texture: parameter estimation with respect to crystal and sample symmetries" *Journal of Applied Crystallography* **49** 1315-1319 (2016).

23. C. Nisoli, H. Zong, S.R. Niezgoda, D.W. Brown, T. Lookman. "Long-time behavior of the ω to α transition in shocked Zirconium: Interplay of nucleation and plastic deformation" *Acta Materialia* **108** 138-142 (2016).

24. P. Zhao, T.S.E. Low, Y. Wang, S.R. Niezgoda. "An integrated full-field model of concurrent plastic deformation and microstructure evolution: Application to 3D simulation of dynamic recrystallization in polycrystalline copper" *International Journal of Plasticity* **80** 38-55 (2016).

25. T.J. Hardin, T. J. Ruggles, D. P. Koch, S. R. Niezgoda, D. T. Fullwood, E. R. Homer. "Analysis of traction–free assumption in high–resolution EBSD measurements" *Journal of Microscopy* **260** 73-85 (2015).

26. R. Shi, N. Zhou, S.R. Niezgoda, Y. Wang, "Microstructure and transformation texture evolution during α precipitation in polycrystalline α/β titanium alloys–A simulation study" *Acta Materialia* **94** 224-243 (2105)

27. T.S.E. Low, D.W. Brown, B.A. Welk, E.K. Cerreta, J.S. Okasinski, S.R. Niezgoda. "Isothermal annealing of shocked zirconium: Stability of the two-phase α/ω microstructure" *Acta Materialia* **91** 101-111 (2015).

28. M.A. Kumar, A. K. Kanjarla, S. R. Niezgoda, R. A. Lebensohn, C. N. Tomé. "Numerical study of the stress state of a deformation twin in magnesium" *Acta Materialia* **84** 349-358 (2015).

29. H. Zong, T. Lookman, X. Ding, C. Nisoli, D.B. Brown, S.R. Niezgoda, S. Jun. "The kinetics of the ω to α phase transformation in Zr, Ti: Analysis of data from shock-recovered samples and atomistic simulations" *Acta Materialia* **77**, 191-199 (2014).

30. S.R. Niezgoda, C.N. Tomé, I.J. Beyerlein, "Stochastic modeling of twin nucleation in polycrystals: An application in hexagonal close-packed metals," *International Journal of Plasticity*, **56**, 119-138 (2014).

31. D.W. Brown, L. Balogh, D. Byler, C.M. Hefferan, J.F. Hunter, P. Kenesei, S.F., J. Lind, S.R. Niezgoda, R.M. Suter, "Demonstration of near Field High Energy X-Ray Diffraction Microscopy on High-Z Ceramic Nuclear Fuel Material" *Materials Science Forum*, **777**, 112-117 (2014).

32. S.R. Niezgoda, I.J. Beyerlein, A.K. Kanjarla, C.N. Tomé, "Introducing Grain Boundary Influenced Stochastic Effects into Constitutive Models," *JOM Journal of the Minerals, Metals and Materials Society*, **65**, 419-430 (2013).

33. S.R. Niezgoda, A.K. Kanjarla, S.R. Kalidindi, "Novel Microstructure Quantification Framework for Databasing, Visualizing, and Analysis of Microstructure Data" *Integrating Materials and Manufacturing Innovation*, **2**, (2013) .

34. L. Balogh, S.R. Niezgoda, A. Kanjarla, B. Clausen, D.W. Brown, W. Liu, C.N. Tomé, "Spatially resolved in-situ strain measurements from an interior twinned grain in bulk polycrystalline magnesium," *Acta Materialia*, **61**, 3612-3620 (2013).

35. S.R. Niezgoda, J. Glover, "Unsupervised Learning for Efficient Texture Estimation From Limited Discrete Orientation Data," *Metallurgical and Materials Transactions A*, **10.1007/s11661-013-1653-7**, 1-15 (2013).

36. S.R. Niezgoda, R.J. McCabe, C.N. Tomé, "Quantification of strain and orientation measurement error in cross-correlation error in hexagonal close-packed materials," *Scripta Materialia*, **67**, 818-821 (2012).

37. S.M. Qidwai, S.R. Niezgoda, D.M. Turner, A.C. Lewis, S.R. Kalidindi, A.B. Geltmacher, D.J. Rowenhorst, "Mechanics of polycrystalline materials using representative statistical volume element sets built on microstructure," *Acta Materialia*, **60**, 5284-5299 (2012).

38. S.R. Niezgoda, Y. Yabansu, S.R. Kalidindi, "Understanding and visualizing microstructure and microstructure variance as a stochastic process," *Acta Materialia*, **59**, 6387-6400 (2011).

39. T. Fast, S.R. Niezgoda, S.R. Kalidindi, "A new framework for computationally efficient structure-structure evolution linkages to facilitate high-fidelity scale bridging in multi-scale materials models," *Acta Materialia*, **59**, 699-707 (2011).

40. S.R. Kalidindi, S.R. Niezgoda, A.A. Salem, "Microstructure informatics using higher-order statistics and efficient data-mining protocols," *JOM Journal of the Minerals, Metals and Materials Society*, **63**, 34-41 (2011).

41. **Invited Review Paper:** D.T. Fullwood, S.R. Niezgoda, B.L. Adams, S.R. Kalidindi, "Microstructure sensitive design for performance optimization," *Progress in Materials Science*, **55**, 477-562 (2010).

42. S.R. Niezgoda, D.M. Turner, D.T. Fullwood, S.R. Kalidindi, "Optimized structure based representative volume element sets reflecting the ensemble averaged 2-point statistics," *Acta Materialia*, **58**, 4432-4445 (2010).

43. G. Landi, S.R. Niezgoda, S.R. Kalidindi, "Multi-scale modeling of elastic response of three-dimensional voxel based datasets using novel DFT-based knowledge systems," *Acta Materialia*, **58**, 2716-2725 (2010).

44. D.D. Gerrad, D.T. Fullwood, S.R. Niezgoda, "Computational Homology, connectedness and structure-property relations," *Computers, Materials and Continua*, **15**, 129-152 (2010).

45. S.R. Kalidindi, S.R. Niezgoda, G. Landi, S. Vachhani, T. Fast, "A novel framework for building materials knowledge systems," *Computers, Materials, and Continua*, **17**, 103-126 (2010).

46. S.R. Niezgoda, S.R. Kalidindi, "Applications of complex phase coded generalized Hough transform to feature extraction and image segmentation in digital micrographs," *Computers, Materials, and Continua*, **14**, 79-97 (2009).

47. S.R. Kalidindi, M. Knezevic, S.R. Niezgoda, J. Shaffer, "Representation of the orientation distribution function and computation of first-order elastic properties closures using discrete Fourier transforms," *Acta Materialia*, **57**, 3916-3923 (2009).

48. S.R. Niezgoda, D.T. Fullwood, S.R. Kalidindi, "Delineation of the space of 2-point correlations in a composite material system," *Acta Materialia*, **56**, 5285-5292 (2008).

49. D.T. Fullwood, S.R. Niezgoda, S.R. Kalidindi, A. Fast, N. Hampson, "Gradient-based microstructure reconstructions from distributions using fast Fourier transforms," *Materials Science and Engineering: A*, **494**, 68-72 (2008).

50. D.T. Fullwood, S.R. Niezgoda, S.R. Kalidindi, "Microstructure reconstructions from 2-point statistics using phase-recovery algorithms," *Acta Materialia*, **56**, 942-948 (2008).

51. S.R. Niezgoda, V. Gupta, R. Knight, R. Cairncross, T. Twardowski, "Effect of reinforcement size on the scratch resistance and crystallinity of HVOF sprayed nylon-11/ceramic composite coatings," *Journal of Thermal Spray Technology*, **15**, 731-738 (2006).

Selected Peer Reviewed Conference Publications and Technical Reports

J. Matuk, O. Chkrebtii, S.R. Niezgoda. "Bayesian Inference for Crystallographic Texture Uncertainty Quantification." *AIAA Scitech 2019 Forum*, (AIAA 2019-0968)

D. Ricciardi, O. Chkrebtii, H.L. Fraser, S.R. Niezgoda, "Ensemble Predictions of Material Behavior for ICMSE," *2018 AIAA Non-Deterministic Approaches Conference, AIAA SciTech Forum*, (AIAA 2018-0924).

M. Yuan, N. Galbincea, A. Salem, S.R. Niezgoda, "Validation and Uncertainty Quantification for Manufacturing Design Accounting for Material Variability," *2018 AIAA Non-Deterministic Approaches Conference, AIAA SciTech Forum*, (AIAA 2018-0926).

S.R. Niezgoda, M. Yuan, N. Galbincea, A. Salem, J.B. Shaffer"Non-Intrusive Stochastic Modeling to Account for Microstructure Variability," *2017 AIAA Non-Deterministic Approaches Conference, AIAA SciTech Forum, (AIAA 2017-0816)*.

AA Salem, JB Shaffer, SR Niezgoda, DP Satko, SR Kalidindi, A Buijk "Microstructure Uncertainty Propagation in Sheet Metal Forming Fe?Simulations: Springback of Commercial?Purity Titanium." *Proceedings of the 13th World Conference on Titanium*, 1881-1886 (2016)

Book Chapters

S.R. Niezgoda "Representation of Stochastic Microstructures" in *Statistical Methods for Materials Science: The Data Science of Microstructure Characterization*(eds Jeffrey P. Simmons, Lawrence F. Drummy, Charles A. Bouman, Marc De Graef), CRC Press, (2019) ISBN 9781498738200.

S.R. Niezgoda "Estimation of Orientation Statistics" in *Statistical Methods for Materials Science: The Data Science of Microstructure Characterization*(eds Jeffrey P. Simmons, Lawrence F. Drummy, Charles A. Bouman, Marc De Graef), CRC Press, (2019) ISBN 9781498738200.

D.T. Fullwood, B.L. Adams, K.A. Stevens, S.R. Niezgoda, S.R. Kalidindi "Spectral Methods in the Statistical Description and Design of Microstructure" in *Materials Processing and Texture* (ed A.D. Rollett), John Wiley & Sons, Inc., Hoboken, NJ, USA (2009).

Selected Presentations

Keynote Presentations

S.R. Niezgoda, "Moving beyond the RVE: How do we integrate complex microstructure data into materials response models?" at Gordon Research Conference - Physical Metallurgy, University of New England, Biddeford ME, July 2013.

Invited Presentations

S.R. Niezgoda, M. Gibbons, W. Windl, K.A. Flores, "Shear Banding in Bulk Metallic Glass Matrix Composites with Dendrite Reinforcements" First International Conference on Theoretical, Applied and Experimental Mechanics, Paphos Cyprus, Upcoming June 2018.

S.R. Niezgoda, A. Brust, E. Payton "Incorporating Physical Constraints and Regularization in Min-Cut/Max-Flow Graph Partitioning for Segmentation and Clustering in Materials Imaging" SIAM Conference on Imaging Science, Bologna Italy, Upcoming June 2018.

S.R. Niezgoda "Integrating Crystal Plasticity Simulations with EBSD Datasets" EBSD 2018, Ann Arbor MI, upcoming May 2018.

S.R. Niezgoda, J. Mattuk, O. Chkrebtii, "Application of the symmetrized Bingham distribution for the modelling of texture uncertainty" 8th International Conference on the Texture of Materials, St. George UT, November 2017.

S.R. Niezgoda, A Brust, E. Payton, "Probabilistic methodology for analyzing and reconstructing parent microstructures from EBSD maps of transformation products" 18th International Conference on the Texture of Materials, St. George UT, November 2017.

S.R. Niezgoda, A. Brust, "Stochastic Reconstruction of Prior Austenite Grain Structures from EBSD Maps" Air Force Workshop on Affordable Munition Steels, Eglin Air Force Base Eglin FL, October 2017.

S.R. Niezgoda "Understanding and Manipulating Orientation and Mis-Orientation Data From EBSD- Integration with crystal plasticity modeling" EDAX EBSD Workshop, Columbus OH, October 2017.

S.R. Niezgoda, M. Yuan, "Non-Intrusive Stochastic Modeling to Account for Microstructure Variability" a AIAA Non-Deterministic Approaches 2017 (part of AIAA SciTech 2017), Grapevine TX, December 2016.

S.R. Niezgoda, P, Zhao, T.S.E. Low, M.Gibbons, K.Flores, Y.Wang, W. Windl, "Opportunities in Mesoscale Simulation: Integration of Physics based constitutive theories with Microstructure evolution" Case Western Reserve University, Department of Materials Science and Engineering Seminar Series, Cleveland OH, Upcoming October 2016

S.R. Niezgoda, P, Zhao, T.S.E. Low, M.Gibbons, K.Flores, Y.Wang, W. Windl, "Opportunities in Mesoscale Simulation: Integration of Physics based constitutive theories with Microstructure evolution" Colorado School of Mines, Department of Mechanical Engineering, Department of Materials Science and Engineering Seminar Series, Golden CO, September 2016

S.R. Niezgoda, M. Gibbons, K.A. Flores, W. Windl, "Computational Modeling of Shear Banding in Bulk Metallic Glass Composites" at International Union of Theoretical and Applied Mechanics Workshop on Integrated Computational Structure-Material/Modeling of Deformation: Failure Under Extreme Conditions, Baltimore MA, June 2016.

S.R. Niezgoda, T.S.E. Low, D.B. Brown, E.K. Cerreta, C. Nisoli, C. Bronkhorst, "The Curious Case of Metastable Highpressure ω Phase in Group IV HCP Metals" at Possibilities and Limitations of Quantitative Materials Modeling and Characterization 2016, Berkastel-Kues Germany, Upcoming May 2016.

S.R. Niezgoda, A.A. Salem, J.B. Shaffer, D.P. Satko, "Microstructure-Uncertainty Propagation in Sheet Metal Forming FE-Simulations" at Computational Methods for Uncertainty Quantification, Model Validation, and Stochastic Predictions - TMS Annual Meeting, Nashville TN, February 2016.

S.R. Niezgoda, E.A. Magnuson, J. Glover, "Bingham Mixture Model for Efficient Microtexture Estimation from Discrete Orientation Data" at Driving Discovery: Integration of Multi-Modal Imaging and Data Analysis - TMS Annual Meeting, Mashville TN, February 2016.

S.R. Niezgoda, P. Zhao, T.S.E. Low, Y. Wang, " Fully Coupled Phase-Field and Dislocation Based EVPFFT Crystal Plasticity" at 22nd International Symposium on Plasticity and its Applications, Kona HI, January 2016.

S.R. Niezgoda, P. Zhao, TSE. Low, D.B. Brown, "Twinning and Metastable High-Pressure Phases in Group 4 Hexagonal Metals, Observations from Experiment and Simulation" at Drexel University Materials Science and Engineering Seminar Series, Philadelphia PA, October 2015.

S.R. Niezgoda, P. Zhao, Y. Wang, "Fully Coupled Phase-Field and Elasto- Viscoplastic Fast Fourier Transform Models for Advanced Mesoscale Thermal- Mechanical Processing Simulation" at Predictive Modeling of the Co-Evolution of Microstructure and Properties - USACM 13th US National Congress on Computational Mechanics, San Diego CA, July 2015.

S.R. Niezgoda "Measurement and Simulation of Type II and Type III Residual Stresses in Polycrystalline Materials" at American Welding Society Workshop on Weld Residual Stress and Distortion Prediction, Bethlehem PA, August 2015.

S.R. Niezgoda, P. Zhao, Y. Wang, "Fully Coupled Phase-Field and Elasto-Viscoplastic Fast Fourier Transform Models for Advanced Mesoscale Thermal-Mechanical Processing Simulation " At Airforce Research Laboratory, Dayton OH, March 2015.

S.R. Niezgoda, P. Zhao, Y. Wang, "Coupled phase field and elasto-viscoplastic FFT models for mesoscale simulation", at Possibilities and Limitations of Quantitative Materials Modeling and Characterization 2015, Berkastel-Kues Germany, May 2015.

S.R. Niezgoda, "Comparison of Microstructure Quantification Frameworks" at Data Analytics for Materials Science and Manufacturing - TMS Annual Meeting, San Diego CA, Feb 2014.

S.R. Niezgoda, C.N. Tomé, I.J. Beyerlein "Incorporating stochastic effects into homogenized plasticity models" at 20th International Symposium Plasticityand its applications, Freeport Bahamas, January 2014.

S.R. Niezgoda, "Rethinking materials data: extracting knowledge from pretty pictures" at Airforce Research Laboratory, Dayton OH, October 2013.

S.R. Niezgoda, "Advances in statistical microstructure quantification: Bridging characterization, experiment, and simulation" at Synergies of Computational and Experimental Materials Science II - TMS Annual Meeting, San Antonio TX, March 2013.

S.R. Niezgoda, "Construction of evolutionary microstructure databases: Applications to materials genome initiative" at Inverse Methods in Materials Design - SES (Society of Engineering Sciences) 2012, Atlanta GA, October 2012.

S.R. Niezgoda,"Non-stationary microstructure processes: Quantification of texture gradients and orientation, micro-texture spatial correlations" at Quantification of Texture and Microstructure Gradients in Polycrystalline Materials MS&T - 2012, Pittsburgh PA, October 2012.

S.R. Niezgoda, B. Wohlberg, J. Bassigner, D.T. Fullwood, "Applications of Bayesian blind deconvolution in electron backscatter diffraction microscopy" at ICOTOM 16, Mumbai India, December 2011.

S.R. Niezgoda, "Experimental and model epistemic and aleatoric uncertainty: connections to microstructural variance" at Uncertainty Quantification and Multiscale Materials Modeling Workshop, Santa Fe NM, June 2011.

S.R. Niezgoda, D.M. Turner, D.T. Fullwood, S.R. Kalidindi, "Evaluation and generation of representative volume elements - A characterization and modeling based approach" at Three-Dimensional Materials Science VI-TMS Annual Meeting, Seattle WA, 2010.

Scientific Software Developed and Distributed

T.S.E. Low, S.R. Niezgoda. "FFT FS - A general spectral solver for finite strain micromechanical problems"'
Standalone implementation of spectral solver for general micromechanical problems accounting for large deformations and rotations. Based on Eisenlohr's elastic viscoplastic crystal plasticity solver included in DAMASK. Written in C, full MPI parallel programming. Support for Unix and Linux systems.

P. Zhao, Y. Wang, S.R. Niezgoda. "FFT Phase Field Crystal Plasticity"
Fully integrated spectral phase field and crystal plasticity solver with dislocation based crystal plasticity formulation. Includes case study for dynamic recrystallization in FCC metals. Written in C, full MPI parallel programming. For Unix and Linux systems.

A. Brust, S.R. Niezgoda. "KSVD-RVE"
Patch based methodology for creating 2D and 3D representative microstructures that makes use of KSVD inpainting techniques. Written in MATLAB

J. Glover, S.R. Niezgoda. "BINGHAM - The Bingham Statistics Library."
C++ and Matlab library contains implementations of the Bingham distribution for directional (axial) statistics on the unit spheres S1, S2, and S3. Currently being maintainted and updated by S. Reidel

Professional Service & Development

Forging Industry Education and Research Foundation Magnet School Professor 2016 - present
> In 1992 Forging Industry Educational and Research Foundation (FIERF) established the Magnet School Program to increase awareness and knowledge of the forging industry among university engineering and metallurgy students. The Foundation has partnered with universities where faculty members have expressed interest in forging, course enrichment in forging processes and application as well as receptivity to research and development projects of potential value to the forging industry. The goals of the program are to provide future engineers an appreciation of the value of utilizing forged products and to attract new generations of engineering students into the forging industry as a career.

Conference Organization

> **EBSD 2018** May 2018, Ann Arbor Michigan
> > S.R. Niezgoda (Lead), M. De Graef, E. Marquis
> > EBSD is a biannual meeting organized through the Microanalysis society, and is dedicated to characterization of crystallography using electron beam diffraction, primarily Electron Back Scatter Diffraction

(EBSD) on the scanning electron microscope. The first day, will be split into two tracks with an introduction/ basic track and an advanced track with all day tutorials in each including lectures on EBSD theory and application and hands-on demonstrations about how to run the basic EBSD experiments and data analyses. The first day will also include live demonstrations of the latest EBSD hardware and software so that attendees with more experience can interact with the EBSD and related technology vendors. The programming for the second and third days will be comprised of plenary and contributed presentations highlighting recent developments, data analysis methods, and materials and geo-science applications. We will have a poster session and competition on the afternoon of the second day, followed by a banquet to celebrate the meeting.

Conference Symposia Organization

Heterogeneity during Plastic Deformation - Synergy between Experimental Investigation and Simulation
Materials Science and Technology (MS&T) 2016, October 2016, Salt Lake City Utah
S.R. Niezgoda and D.T. Fullwood

Scaling Effects in Crystal Plasticity: Synergy between simulations and experiments 2014 MRS Fall
Meeting, Nov 2014, Boston Massachusetts
S. Van Petegem, P. Anderson, S.R. Niezgoda, L. Thilly

Professional Society Governance

Education Committee *The Minerals, Metals and Materials Society* 2018-2021
The TMS Education Committee consists of individuals representing academia, government, and industry who are interested in the preparation of future professionals for the minerals, metals, and materials field. Specifically, the committee is involved with materials science & engineering education (university level); outreach programs and the distribution of career information (pre-university level); textbook, software, and other educational resource development; review of educational project proposals to the TMS Foundation; and cooperation with other societies and committees who share these areas of interest.

Public and Governmental Affairs Committee *The Minerals, Metals and Materials Society* 2018-2021
Through its Public & Governmental Affairs Committee, TMS advocates for broad-based materials-related research and development, supports STEM programs, and promotes the materials science and engineering profession. The society offers the following opportunities for members to educate themselves on public policy issues relevant to their careers and to provide their expert advice to congressional leaders and the public.

Journal Review

Acta Materialia, Scripta Materialia, Computational Materials Science, Computers Materials and Continua, Ultramicroscopy, Materials Characterization, Journal of Applied Crystallography, International Journal of Plasticity, Integrating Materials and Manufacturing Innovation, Journal of Materials Processing Technology, ASME Journal of Engineering Materials and Technology.

Memberships

Honor Societies: *Alpha Sigma Mu* – Materials Science and Engineering Honor Society,
Tau Beta Pi – International Engineering Honor Society

Professional Societies: *American Society of Mechanical Engineers, The Minerals, Metals and Materials Society, Professional Aviation Maintenance Association, American Association for the Advancement of Science.*

Selected Honors, Awards and Fellowships

International Journal of Plasticity Young Researcher Award 2018
he IJP Award was established to honor individuals within 15 years of receiving their PhD who have demonstrated excellence over the previous 5-year period in the field of plasticity. The award selection is made by a

committee and considered: (1) scientific impact of all papers for the last five years; (2) quality and quantity of research contributions to the field of plasticity; (3) activities aiming at increasing the impact of science on society; (4) scientific impact of papers published in the International Journal of Plasticity.

OSU Lumley Research Award 2017

The Lumley Engineering Research Awards are presented to a select group of outstanding researchers in the College of Engineering who have shown exceptional activity and success in pursuing new knowledge of a fundamental or applied nature.

Defense Advanced Research Projects Agency (DARPA) Young Faculty Award 2015

The objective of the DARPA Young Faculty Award (YFA) program is to identify and engage rising research stars in junior faculty positions at U.S. academic institutions and introduce them to Department of Defense needs as well as DARPA's program development process.

Thesis Award

Most Promise to Enhance Drexel's Reputation in the Mathematical Sciences and Engineering, 2010

Fellowships

National Science Foundation Graduate Research Fellowship (NSF-GRFP), 2008-2010

National Defense Science and Engineering Graduate Fellowship (NDSEG), 2008
Declined in favor of NSF-GRFP

National Science Foundation Integrative Graduate Education and Research Traineeship in Nanoscale Science and Engineering (NSF-IGERT), 2006-2008

Last updated: January 20, 2020