

**Prof. Victoria Miller**  
**Assistant Professor**  
**University of Florida**  
**Gainesville, FL**  
**Trustee (2024-2027)**



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Assistant Professor Victoria (Tori) Miller has been in the Department of Materials Science and Engineering at the University of Florida since September 2019. Prior to her appointment at UF, she was an assistant professor at NC State University from 2017 to 2019.

She received her B.S.E. in Materials Science and Engineering from the University of Michigan in 2011 and completed her Ph.D. in the Materials Department at the University of California Santa Barbara in 2016. After graduate school, she worked for a year at UES, Inc. as a Research Scientist onsite in the Materials and Manufacturing Directorate of the Air Force Research Laboratory in Dayton, OH. She had also previously worked at Ford Motor Company Research and Development, Toyota Engineering and Manufacturing North America, and Lockheed Martin Aeronautics. Outside the lab, she trains for and competes in powerlifting.

## **Abstract: Expanding the Boundaries of Recrystallization in Ni Base Superalloys**

### **Abstract:**

Control of the final grain size distribution in a microstructure is of primary importance for superalloys which require narrow tolerance of mechanical properties, such as tensile strength, creep resistance, and fatigue resistance. There is a direct link between the microstructure and properties of a material, and therefore predicting the post processing microstructure is of critical importance. Phenomena such as abnormal grain growth and unpredicted recrystallization phenomena have historically hindered predictive models; however, a recently observed recrystallization mechanism known as Heteroepitaxial Recrystallization (HeRX) may provide answers. HeRX is active at lower strains than conventional recrystallization and may contribute to abnormal grain growth and may explain other unexplained microstructural phenomena. Deeper understanding of the HeRX mechanism provide a solution for controlling the grain size distribution of microstructures during final shaping and processing.

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## **Abstract: Predicting the Occurrence and Mechanism of Liquid Metal Embrittlement Using Machine Learning**

### **Abstract:**

Predicting whether liquid metal embrittlement (LME) will occur between a given pair of liquid and solid metals is key to enabling the use of liquid metals in a wide variety of applications. Most previous attempts have considered LME binary: LME or no LME. Recent developments have separated liquid metal embrittlement into multiple mechanisms; in this work, data was extracted from over 1000 publications spanning over 100 years of LME research, separated by

mechanism, then several machine learning classification techniques, including k-nearest neighbors (KNN) classifiers and decision tree classifiers, were used to develop a model that predicts the occurrence and mechanism of LME.

Specifically, a KNN classifier using a 1-vs-1 approach for predicting each LME mechanism is more than 80% accurate, surpassing predictive models in the literature. Additionally, a 1-vs-1 decision tree model is used to investigate the features of the liquid-solid pair that are most important for predicting LME.

## **Abstract: Infrastructure Development for Integrated Computational Materials Engineering (ICME) Pipelines**

### **Abstract:**

One of the key differences between the field of materials science and engineering (MSE) today and the field of MSE in decades past is the ability to generate large amounts of data quickly; a growing challenge facing the field is stewarding and managing that data so that it is useful, i.e. following the FAIR (findable, accessible, interoperable, reuseable) data standards. Miller's research group has several ongoing efforts to improve data accessibility and reuseability in the ICME community. One critical type of data is crystallographic texture, a statistical description of the 3D rotations of the crystals that compose a bulk material. In historical literature this data is often represented as contour plots, rendering the data unrecoverable. Miller's group has developed a tool that allows a user to extract the underlying data from these contour plots and a data standard allowing uniform archival storage, enabling data mining and reuse.