Clarkson University

Mathematics REU Speaker Series

Summer 2022

Monday July 11, 2022 @ 11 am in SC 356

Attend the talk via zoom:
https://clarkson.zoom.us/j/98680644309

Visualizing Crystal Orientation Using Electron Backscatter Diffraction (EBSD)

People in the field of materials science work to link the past history and current structure of materials to the properties and performance criteria that the material is expected to meet in service. Investigations into the structure span several length scales, from the macro scale of an entire part (meters to centimeters), to the mesoscale arrangement of crystals (millimeters to nanometers), and finally to the atomic scale position and bonding of the atoms themselves (nanometers to picometers).

For over 100 years a key tool to investigate the mesoscale has been the use of images of the micro structure, which has given substantial insight in the link between the atomic scale and macro scale and the resulting effects on properties and performance. In the past few decades an imaging technique called Electron Backscatter Diffraction (EBSD) has been developed and has been extensively used to map the crystal orientation inside a micro structure in a wide variety of materials. This presentation will provide an overview of crystal systems, conventions for describing crystal orientation, a short description of how EBSD works, the types of image data that can be created from EBSD data, and how some of these data are used.

In addition to this example of his technical work, Dr. Creuziger is willing to share and discuss:

- Experiences in getting a position at and working at a national lab.
- Key things I've learned along the way in my career.
- Other research projects he has worked on including: phase fraction measurements, texture analysis, austenite to martensite transformation predictions, crystal plasticity modeling, metal-on-metal hip joints, Apollo F-1 engine conservation, and/or shape memory alloys.

Adam Creuziger , Ph. D.

Dr. Creuziger graduated with a bachelor of aerospace engineering and mechanics (BAEM) degree from the University of Minnesota in 2002. He then attended the University of Wisconsin-Madison, gaining M. S. (2005) and Ph.D. (2008) degrees in Engineering Mechanics. Dr. Creuziger was awarded a National Research Council (NRC) Research Associate Fellowship to work at the National Institute of Standards and Technology (NIST) in Gaithersburg MD starting in 2008. He has been a staff member at NIST since 2012, and was honored as a 2013 Presidential Early Career Award for Scientists and Engineers (PECASE) awardee.

The Mathematics REU seminar series is weekly that has been supported by National Security Agency and National Science Foundation.

Please contact: Guangming Yao (gyao@clarkson.edu) or James Greene (jgreene@clarkson.edu) for more information.