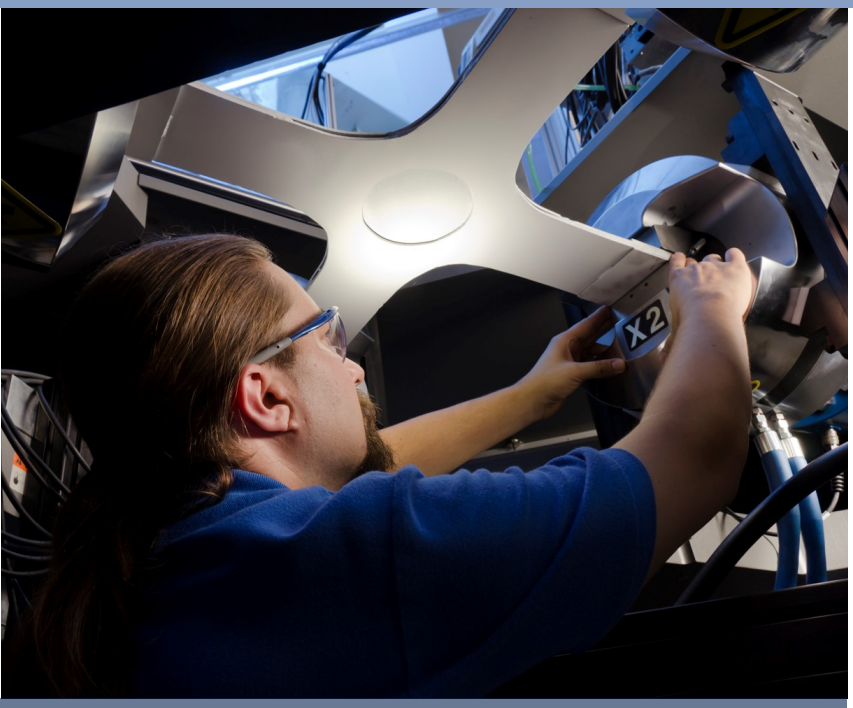
SEMINAR SERIES

PHASE FRACTION MEASUREMENTS IN TEXTURED MATERIALS

THURSDAY, NOVEMBER 8 | 4 P.M.| HILL HALL 202



ADAM CREUZIGER

NATIONAL INSITUTE OF STANDARDS AND TECHNOLOGY

Dr. Creuziger grew up in Central Wisconsin, and 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 recently honored with a Presidential Early Career Award for Scientists and Engineers (PECASE).

The National Institute of Standards and Technology (NIST) Center for Automotive Lightweighting (NCAL) has several efforts to assist the automotive industry in relevant measurement problems. Many automotive manufacturers have identified vehicle lightweighting as the primary means to meet current and upcoming fuel economy targets. One such problem is measurement of phase fractions in steel. 3rd Generation Advanced High Strength Steels (3GAHSS) are a promising category of materials that combine high strength and high elongation. This combination of properties are obtained by an initial mixture of phases and selective transformation of some of the phases during deformation. Therefore the amount of each phase, or phase fraction, is a key property to quantify in the as-processed steel and as a function of deformation.

Unfortunately, despite having used steel for nearly 4,000 years, this measurement remains a challenge. One of the largest factors affecting phase fraction measurements is crystallographic texture, or preferred orientation. Texture strongly affects diffraction-based phase fraction measurements (x-ray and neutron), and is inherent in the deformation and phase transformations that occur during processing and fabrication. The traditional approach to reduce the degree of texture is to grind a sample into a fine powder. Unfortunately, due to the metastable nature of the phases, this method is inapplicable. Methods to measure phase fractions in materials with texture have largely not been developed or assessed for accuracy. This presentation will discuss some of the techniques we have developed to assess errors in phase fraction measurements caused by texture and methods to minimize these errors.

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: 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.

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