Materials Science & Engineering Graduate Seminar

Wednesday, October 16 2019, 4:10-5:00PM, WEB 1230

Dr. David Fullwood

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HRDIC and EBSD Study of Slip-band Behavior

Materials that exhibit strong shear-band behavior, such as Inconel, provide an ideal venue for studying slip band interactions with grain boundaries. As a slip band approaches a grain boundary, the shear diminishes rapidly, resulting in a strain gradient that is accompanied by a pileup of geometrically necessary dislocations (GNDs). Using HRDIC, the strain gradient can be measured, and the underlying dislocation structure determined. The resultant stress at the tip of the line of dislocations can thence be quantified. By simultaneously recording the local lattice orientation across the sample using EBSD, the GND distribution indicated by the standard Nye tensor can be determined. The active slip system correlating with the local lattice curvature can be compared with that identified from the HRDIC data. This enables more detailed studies of the impact of GBs on plastic deformation in polycrystalline materials.

David Fullwood is a member of the Materials group in the Mechanical Engineering Department at BYU. Following his PhD in mathematics he spent 12 years working for the nuclear industry in the UK. As Head of R&D and Head of Mechanical Engineering he developed high-speed energy storage flywheels based on novel composites for two spin-off companies. Dr Fullwood returned to academia in 2004, with a brief spell at Drexel University followed by his current position at BYU.