

Graduate Student Research Seminar

Spring 2024

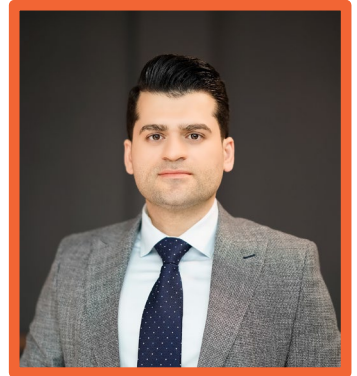
Experimental Techniques and Processes to Nucleate Deformation Twins

Seyed Ali Asli

Advisor: Dr. Garrett Pataky

Monday, February 19th

3:00 pm (EST) – 132 Fluor Daniel Building



Abstract

Slip and twinning are two dominant mechanisms of plastic deformation in metals. Depending on some specific conditions, including a very low-temperature environment, the precedence of the mentioned mechanisms will be exchanged in various types of crystal structures. For example, the slip is more common in face-centered cubic (FCC) materials at room temperature. As the temperature decreases, in contrast, the role of twinning will become more significant in the deformation. Two major types of twins can occur in the materials: one known as annealing twinning, which is related to the heat treatment processes, and another one called deformation twinning (also known as mechanical twinning), which stems from the mechanical activities on the materials. This presentation covers the experimental techniques and processes to nucleate deformation twinning in Copper-Aluminum alloy. Several techniques and practical processes are required to nucleate deformation twinning inside materials, including heat treatment, polishing, and pre-strain. Moreover, a few methods exist to distinguish twinning traces, such as electron backscatter diffraction (EBSD). This study is a part of a comprehensive research to investigate the effect of deformation twinning on fatigue crack growth.



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