

## STRAIN EVOLUTION AFTER FIBER FAILURE IN SINGLE FIBER METAL MATRIX COMPOSITES

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Successful application of metal matrix composites often requires strength and lifetime predictions that account for the deformation of each constituent. However, the deformation of individual phases in composites usually differs significantly from their respective monolithic behaviors. For instance, generally little is known about the *in-situ* deformation of the metal matrix and fiber/matrix interface region, other than that it likely differs from the bulk material response. In this presentation, an approach will be presented that quantifies the *in-situ* deformation parameters using neutron diffraction measurements around a fiber fracture in a model composite of an Al matrix with a single Al<sub>2</sub>O<sub>3</sub> fiber. The shear sliding resistance as it evolves through fiber fracture upon loading and unloading was also studied. In addition, the effect of matrix plasticity on the overall composite behavior was investigated. Matching the stress/strain distributions predicted from micromechanical models to the measured strain distributions determined by neutron diffraction under applied tensile loading results in an estimate of the *in-situ* mechanical behavior of the matrix and the fiber.