EBSD characterization of deformation in high strain rate application aluminum alloys

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ABSTRACT

Advances in materials characterization tools and techniques are contributing to an improved physics based understanding pertaining to the characteristic behavior of engineering alloys. Aluminum alloys, such as 2139, 2519, 5083, and 7039 are commonly used for lightweight armor applications where resistance to high strain rate deformation is paramount. Failure of these materials is often attributed to the onset of shear band formation. This study was aimed at complimenting the constituent predictive models that describe the mechanical behavior of these alloys using Electron Backscatter Diffraction techniques as a means of microstructural characterization. As such, a quantitative microstructural metric was developed that describes the process by which damage accumulates within the material during high strain rate deformation.