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Microstructural Effects on the Spall Properties of ECAE Magnesium and Magnesium Alloys CYRIL WILLIAMS, Army Research Laboratory — Magnesium and magnesium alloys are light weight materials and hence, are being increasingly employed as light armor in military applications. However, because of its limited slip systems (HCP) magnesium and magnesium alloys are relatively brittle as compared to FCC and BCC lattice structures. For this study, the effects of microstructure on the spall properties of magnesium and magnesium alloys processed using Equi-Channel Angular Extrusion (ECAE) were investigated using a 51 mm and 105 mm bore gas guns. Symmetric spall and recovery plate impact experiments were performed at impact velocities ranging from approximately 100 m/s and 400 m/s. Free surface velocity profiles of the shocked samples were obtained using Photonic Doppler Velocimetry (PDV). The spall strength and Hugoniot Elastic Limit (HEL) were extracted from the free surface velocity profiles. In addition, the microstructures of the pre-shocked and post-shocked magnesium and magnesium alloys were acquired using Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM).

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