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Meso-Scale Simulation of the Shock Compression Response of Equiaxed and Needle Morphology 6061 Aluminum Powders D. ANTHONY FREDENBURG, Georgia Institute of Technology, TRACY J. VOGLER, Sandia National Labs, NARESH N. THADHANI, Georgia Institute of Technology — Particle level simulations on equiaxed and needle morphology 6061 Al powders are carried out on real microstructures to determine the shock densification response of powder compacts pre-pressed to 68% theoretical density. Two particle configurations are investigated, homogeneous particles with properties of bulk 6061 Al, and 6061 Al particles with a 2 micron thick high strength outer shell, representative of a nanocrystalline surface layer. A linear shock velocity-particle velocity relationship is observed for the homogeneous particle configuration over the particle velocity range 200-850 m/s. Deviation in shock velocity-particle velocity linearity is observed at lower particle velocities for the layered particles with material behavior approaching linearity as particle velocity increases. In addition, a novel scheme for determining vorticity in interparticle contact areas is presented for the purpose of elucidating the effect of particle morphology on compaction characteristics. Research funded through Sandia Contract # 521274.

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