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Shock Compression and Impact Response of Ta + Iron(III)Oxide Powder Mixtures D. ANTHONY FREDENBURG, NARESH N. THADHANI, Georgia Institute of Technology — The shock compression and impact response of equivolumetric Ta + Iron(III)Oxide thermite powder mixtures is investigated through instrumented parallel plate and rod-on-anvil impact experiments. Measurements of stress and shock velocity in the powder mixtures are made with PFDV stress gauges using a uniaxial strain configuration, allowing for determination of the materials' shock compressibility. Results reveal densification of the mixture at stresses up to the crush strength of $\sim$ 5.4 GPa. Densification trends are incorporated into existing compaction models to determine their applicability to the present metal + oxide powder mixture. At stresses above 5.4 GPa an expanded volume state is observed in the plane strain configuration, indicating possible reaction in the mixture. Reaction initiation conditions are also studied in the plane stress configuration, where powders pressed to $\sim$ 75 % theoretical density are mounted on a rod and accelerated to impact an anvil over the velocity range 300-500 m/s. Initiation of reactive mixtures is observed through high-speed digital photography. Research funded by DTRA Grant # HDTRA1-D7-1-0018.

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