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Laser Interferometry Measurements of Cold-Sprayed Copper Thermite Shocked to 30 GPa CHRISTOPHER NEEL, US Air Force Research Laboratory, DAVID LACINA, University of Dayton Research Institute — Plate impact experiments were conducted on a cold-sprayed Al-CuO thermite at peak stresses varying between 5-30 GPa to determine the Hugoniot and characterize any shock induced energetic reaction. Photon Doppler Velocimetry (PDV) measurements were used to obtain particle velocity histories and shock speed information for both the shock loading and unloading behavior of the material. Low stress experiments (<20GPa) exhibited a linearly increasing shock speed with increasing particle velocity. However, an obvious change in slope (i.e. a “kink”) is present in the Hugoniot at stresses above ~ 20 GPa which follow a linear increase up to the highest stresses attained in this work. The change in Hugoniot curve suggests a volume-increasing reaction occurs in this shocked Al-CuO thermite near 20 GPa, but an analysis of the measured particle velocity histories does not support this assertion. To better characterize any shock-induced thermite reactions, emission spectroscopy measurements were obtained at stresses above and below 20 GPa.

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