

Abstract Submitted
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The Energetic Metal Composite under High Strain Rate¹ YUBIN SHEN, NARESH THADHANI, FRED COOK, KARL I. JACOB — Composites with energetic materials like Titanium (Ti), Nickel (Ni), etc. could react upon high velocity impact to absorb some part of the kinetic energy. The impact induced transformation of the composite was characterized by a high-speed digital camera. Ti based composites were pressed and sintered into small rod which was attached to the front of copper rod for test. A series of Taylor impact tests have been carried out on in Ti composite at a velocity range from 118m/s to 308 m/s, and the visible light caused by the composite transformation was observed in all of the cases. The ignition time decreased with increasing impact velocity, but at a decreasing rate. During the impact process, Ti composites first deformed under the impact force, then the copper rod began punching into the sample until the diameter of the sample exceeded the diameter of the copper rod. Light was detected indicating transformation in the composite, at which point the axial strain was in the range of 50% - 60%, and the areal strain was in range of 140% - 170%. Smaller samples were also prepared for the Taylor impact test, and similar phenomenon was observed irrespective of the sample size. It is believed that the shear component of the impact stress played an important role in triggering the transformation of Ti composites. Several Taylor impact tests were also performed to characterize various Ti composite and the results will be presented in this talk.

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