

Abstract Submitted
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The effect of heat treatment on the dynamic behavior of explosively consolidated Ni/Al composites QIANG ZHOU, State Key laboratory of Explosion Science and Technology, Beijing Institute of Technology, PENGWAN CHEN, BINGBING ZHOU, State Key laboratory of Explosion Science and Technology, Beijing Institute of Technology, — The effect of heat treatment (HT) on the mechanical behavior of Ni/Al composites was investigated in this work. The Ni/Al composite was fabricated by explosive consolidation, and underwent HT to improve its ductility. The mechanical response and failure mechanisms of Ni/Al before and after HT were studied using a split Hopkinson bar combined with high-speed digital photograph. The Ni/Al composite before HT fractured into pieces with a yield strength of ~ 350 MPa at 2500-1, showing obvious brittleness. The HT-Ni/Al composite maintained integrity with a lower yield strength of 320MPa at 2500-1, and showed apparent strain hardening during yield stage. It indicates the Ni/Al bonding was enhanced through heat treatment. Two distinct failure mechanisms, axial splitting and shear failure, were observed for the samples before and after HT, respectively. In the case of the Ni/Al composite fabricated in this work, both phases are continuous, which failure mode is dominant is determined by bonding strength. When the bonding is strong, it shows shear failure, otherwise, axial splitting. The DSC and XRD analysis were also conducted, showing no intermetallic was formed during the heat treatment and the chemical reactivity was not affected by the heat treatment.

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