

Public Abstract

First Name:Sourav

Middle Name:

Last Name:Das

Adviser's First Name:Sanjeev

Adviser's Last Name:Khanna

Co-Adviser's First Name:

Co-Adviser's Last Name:

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Department:Mechanical & Aerospace Engineering

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Title:Graphene-SiC Particle Reinforced Aluminum Alloy Composite Foam:
Response to low to High Strain Rate Deformation

Aluminum foams are becoming potential material for multi-functional applications because it is lightweight and has excellent combination of physical, mechanical and noise and vibration mitigation properties. Because of its cellular structure, it exhibits excellent damping capacity, sound and noise absorption, shock and impact energy absorption. Applications of metal foam for energy absorption and crash worthiness require knowledge on their compressive deformation response at various strain rates. The properties of the metal foam are dependent on cell wall, mechanical properties and their micro-structure. Cell wall properties have been potential improved by adding Graphene Nano platelets as reinforced to the Al-foam. This present investigation related to the study of quasi-static compressive behavior and the high strain rate response under dynamic compressive loading in Graphene Al foam. The experimental results show the peak, plateau stress and energy absorption of reinforced foam is much higher than unreinforced foam. The high strain rate compressive behavior of Graphene Al foam (relative density 0.23 to 0.29) has studied using split Hopkinson pressure bar unit. It is found that peak stress, plateau stress and energy absorption of Graphene Al foam increases as the strain rate increases over a range of strain rate from 500 s⁻¹ to 2760 s⁻¹. The plateau stress and energy absorption in the Graphene -Al foam increased by about two times and three times, respectively, respectively compared to unreinforced foam.