

Abstract Submitted
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Impact Initiated Combustion of Aluminum Exposed to Mechanical Pre-Activation¹ JENNIFER BREIDENICH, NARESH THADHANI, Georgia Institute of Technology — The impact initiation of as-received and mechanically activated aluminum powder compacts is investigated using uniaxial stress rod-on-anvil impact experiments. The compacts reveal light emission due to combustion reaction at velocities greater than 320m/s. Mechanical pre-activation, such as that achieved via high-energy ball milling (HEBM) or high strain machining, strain hardens the starting materials, affecting their combustion initiation behavior. The starting materials are characterized by their lattice strain, hardness, and quasi-static compaction behavior. High speed imaging reveals that the “threshold” velocity (minimum velocity necessary for reaction initiation) changes as function of the mechanical pre-activation. Meso-scale simulations performed in CTH are used to correlate the effects of material properties within the powder compact with the crush up, deformation, and reaction behavior.

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