

عنوان مقاله:

COMBUSTION PERFORMANCE OF Ni-COATED AND UNCOATED HIGH ENERGETIC ALUMINUM NANOPARTICLES

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خلاصه مقاله:

High energetic aluminum nanoparticles are mainly used as additive in solid rocket propellants. However, fabrication of these aluminized energetic materials is associated with decreasing the burning rate of propellants due to problems such as oxidation and agglomeration of nanoparticles. In this study, to improve combustion performance of aluminum nanoparticles, coating by metallic Ni shell was studied. Nickel coating of aluminum nanoparticles was performed through electroless deposition (ED) subsequently, morphology and chemical composition of Ni-coated nanoparticles were characterized by scanning electron microscopy (SEM), transmission electron microscopy (TEM), energy dispersive spectroscopy (EDS) and X-ray diffraction (XRD). These studies show that a uniform Ni layer with a thickness of 10 nm is coated on the surface of Al nanoparticles. Thermal analysis of uncoated and Ni-coated aluminum nanoparticles was done using differential thermal analysis (DTA) and thermo gravimetric analysis (TGA). The results of thermal analysis indicate that, coating the aluminum particles by Ni, leads to improvement in combustion performance of aluminum nanoparticles through decreasing critical ignition temperature, ignition delay time of the nanoparticles and promoting the ignition by exothermic chemical reactions between Al and Ni

کلمات کلیدی:

Combustion mechanism, Aluminum nanoparticle, Electroless deposition, Electron microscopy

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