## Surface Passivated Air and Moisture Stable Mixed Zirconium Aluminum Metal-Hydride Nanoparticles

The main goal of this project is to develop air-stable reactive metal nanoparticle (RMNP) materials. We have developed a method for producing stabilized Zr-Al Hydride nano-scale particles with carbohydrate-aluminum gel coatings. Synthesis of surface passivated Zr-Al mixed metal-hydride nanoparticles is accomplished via a multi-step process under inert atmosphere



conditions, initially via a sonochemically-mediated decomposition of a zirconium tetrahydroaluminate, followed by carbohydrate passivation. After the particles were surface passivated using carbohydrates, they were shown to be stable in air, and only partially reacted with water. Amongst some of the possible applications for this nanopowder material is as an energetic additive or a metallization agent for energetic mixtures or solid fuels.

The synthesis provides air and moisture stable nanoparticles with >90% of active metal by mass and a potential to accelerate burn kinetics by up to three orders of magnitude

A. Epshteyn et al. "Surface Passivated Air and Moisture Stable Mixed Zirconium Aluminum Metal-Hydride

Nanoparticles" Mater. Res. Soc. Symp. Proc. 1056, HH03-16 (2008).

Patents and other steps toward commercialization: patent application filed (12/323,617)

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