Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Laser Dispersion and Ignition of Functionalized Aluminum Particles JILLIAN HORN, JAMES LIGHTSTONE, JOEL CARNEY, JASON JOUET, Naval Surface Warfare Center, Indian Head Division — Aluminum nanoparticles prepared in solution by decomposition of an organometallic precursor and functionalized with long-chain perfluorinated carboxylic acids have demonstrated increased performance over H5 Al (8μm) in small scale shock reactivity testspresumably because the oxide coating has been eliminated. Solution phase preparation for this material, however, is unsuitable for large scale production. This talk will highlight a method for large scale production of air-stable passivated aluminum nanoparticles. Aluminum nanocomposite materials with size ranges less than 500 nm have been prepared with various surface passivation/functionalization schemes that eliminate aluminum oxide and reduce the fuel-oxidizer distance to the molecular level. These materials have been characterized to understand the changes in particle size and morphology that occur with different preparation schemes. TGA, DSC, XRD, and IR spectroscopy results will be presented. Additionally, the combustion characteristics of these air stable fluorinated aluminum nanoparticles are studied and compared to untreated aluminum particles using a laser-dispersion and laser-ignition method developed at the Naval Surface Warfare Center, Indian Head Division.

Jillian Horn
Naval Surface Warfare Center, Indian Head Division

Date submitted: 17 Feb 2011 Electronic form version 1.4