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Shape-dependent nanoenergetic gas generators based on bismuth trioxide nanoparticles SRBUHI YOLCHINYAN, MKHITAR HOBOSYAN, KAREN MARTIROSYAN, University of Texas at Rio Grande Valley — There is a growing demand on novel energetic materials called Nanoenergetic Gas-Generators (NGG), which are alternatives to traditional energetic materials including pyrotechnics, propellants, primers and solid fuels. NGGs utilize metal powders as a fuel and non-metal or metal oxides that generate an exothermic mixture, releasing large amounts of gas phase, energy at extremely high temperatures. The intimate contact between fuel and oxidizer significantly enhances the pressure discharge efficiency of nano-energetic materials. If both fuel and oxidizer nanoparticles are spherical, the contact area between them is less than if either fuel or oxidizer particles are rod-like or plate-like. In this work, we utilize micro-fluidic fabrication approach of producing Bi_2O_3 oxidizer nanoparticles with various shapes (spheres, rods and flakes) and use self-assembly technique to combine them with spherical Al nanoparticles. The self-assembled NGGs were tested for pressure discharge values to estimate the dependence of de-pressurization rate on the shape of oxidizer particles. As initial measurements show, the self-assembly of Al and rod-like Bi_2O_3 is significantly improving the NGG pressure discharge abilities.

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