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Solid Propellant Microthrusters based on Nanoenergetic Gas Generators MKHITAR HOBOSYAN, University of Texas at Brownsville, IVAN PUCHADES, LYNN FULLER, SERGEY LYSHEVSKI, Rochester Institute of Technology, KAREN MARTIROSYAN, University of Texas at Brownsville — Space flight propulsion systems for microsattellites (20-100kg) and nanosatellites (less than 20kg) require microthrusters to enable to control a small adjustment in flight mission such as payload delivery, stabilization, guidance, navigation, etc. In this work, we examine high-energy-density nano-energetic materials integrated with Microelectromechanical Systems (MEMS) for application of specific flight purposes. From wide variety of possible nano-energetic systems, $\text{Al-I}_2\text{O}_5$ and $\text{Al-Bi}_2\text{O}_3$ were chosen due to their superior energetic performance compared to other systems. The nano-energetic materials represent higher energy density per volume and pressure discharge values compared to traditional propellants. These advantages guarantee to enhance the thrust-to-weight and thrust-to-power ratios, specific impulse, effective exhaust velocity, thrust, energy density, controlled combustion, etc. The application-specific thrust profiles can be ensured by microthrusters and their arrays. We present experimental substantiation, evaluation and characterization of fabricated proof-of-concept devices with nanoenergetic propellants.

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