Non-Toxic HAN Monopropellant Propulsion

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I. Project Summary

A highly miniaturized, MR-143, green monopropellant thruster was developed in the SBIR Phase II effort for 1N thrust. Phase II testing indicated the initial catalyst bed heater was insufficient. In the SBIR Phase IIE, the thruster was equipped with a more efficient catalyst bed heater. For reliable ignition of the advanced, non-toxic, AF-M315E monopropellant, the catalyst needs to be preheated. This preheat temperature is much higher than what hydrazine thrusters need. Moreover, the combustion temperature of HAN based monopropellants is higher than hydrazine so the catalyst bed heater must be able to withstand repeated soak-back temperatures. Several heater concepts were evaluated and tested in the Phase II extension and are described in this report.

The Phase IIE project accomplished its objectives and developed, fabricated and tested two catalyst bed heaters. One heater designed for the Phase II MR143 thruster is capable of operational testing in vacuum. The second heater is designed for a Phase III 1N thruster delivered to NASA MSFC and is designed for air and vacuum testing.