

Identification and Significance of Innovation

- Most In Space chemical propulsion systems use hydrazine propellant. Hydrazine is highly toxic & unstable.
- Non-toxic HydroxylAmmonium Nitrate (HAN) AF-M315E monopropellant has 12% higher Isp and 60% higher density-Isp than hydrazine monopropellant.
- HAN's combustion temperature is significantly higher at 2083°K.
- The Phase I *Ir/Re chamber* demonstrated pulse and 10 sec firings at 4lbf, the Phase II chamber demonstrated 1N thrust, and the Phase IIE developed a catalyst bed heater
- A *foam catalyst* was developed to ignite HAN AF-M315E.



Phase II 1N Thrust Chamber with Phase IIE Catalyst Bed Heater for HAN-based Monopropellant

Phase II Results

- A 1N thruster was designed and manufactured for non-toxic HAN based monopropellant to replace hydrazine.
- A foam based catalyst was developed and tested
- Ignition of non-toxic AF-M315E with the foam catalyst was demonstrated.
- A 1N thruster was test fired at Aerojet Rocketdyne

Phase II E Results

- A catalyst bed heater was designed and tested for Phase II chamber for vacuum testing
- A catalyst bed heater was designed and tested for Phase III chamber for air or vacuum testing

NASA and Non-NASA Applications

- Mono- and Bi-propellant rocket engines for commercial and military satellites
- Reaction Control Systems for commercial and military satellites
- Apogee Engines for commercial and military satellites
- Jet engine restarters and auxiliary power units
- Divert and Attitude Control Systems for missile interceptors

SBIR Industrial Partner: **AEROJET**

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