

Project Summary

Purpose of the research:

Non-toxic, HAN based monopropellant AFM-315E has been developed by the U.S. Air Force as replacement for hydrazine. AF-M315E offers greater performance and energy density than hydrazine. However, AF-M315E combusts at a significantly higher temperature (1600-1850°C) than hydrazine (800°C). The higher combustion temperature requires development of new thrust chambers and catalyst. In the SBIR Phase II effort, a 1N class thruster was designed, developed, manufactured, and tested with AF-M315E.

Brief description of the research carried out:

In the SBIR Phase II effort, a 1N class thruster was designed, developed, manufactured, and tested with AF-M315E. The 1N thruster was fabricated out of ultra high temperature materials to enable combustion at 1850°C. A new catalyst was developed that is in a metal foam structure to provide longer life than ceramic bead catalyst. Test firings were completed at Aerojet Rocketdyne.

Research findings:

1. A miniaturized 1N thruster, MR-143, was designed, manufactured and tested with non-toxic, AF-M315E, monopropellant.
2. A foam catalyst based with iridium nano-crystals was developed and shown to be able to combust AF-M315E.
3. Hot fire testing was conducted at Aerojet Rocketdyne
4. The program was a success because a flight weight 1N thruster was designed, manufactured and tested with a new, non-toxic monopropellant.
5. Phase III products have resulted.