

NASA SBIR/STTR Technologies

Non-Toxic Ionic Liquid Fuels for Exploration Applications

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SBIR
STTR

Identification and Significance of Innovation

During this Phase II work, ORBITEC will develop and test fire a set of *non-toxic hypergolic ionic liquid fuels* for propulsion systems. The goal is to replace MMH and in so doing simultaneously increase performance and drastically improve safety. The result will be safer, less expensive propulsion systems.

Estimated TRL (1 – 9) at beginning and end of contract: 1 and 4



Non-Toxic Storable Propellants

Technical Objectives and Work Plan

The overall objective is to design, synthesize, and test sets of ionic liquid fuels hypergolic with Nitrogen Tetroxide (NTO) and Liquid Oxygen (LOX). Phase I research will include:

- Synthesizing of ionic hypergols for NTO and for LOX
- Conducting drop ignition tests with the target oxidizers,
- Measuring the material properties of the candidate fuels,
- Determine molecular structures with NMR,
- Predict performance and analyze integration into propulsion systems,
- Scale up synthesis, and
- Conduct ignition tests and small rocket test firings to demonstrate performance.

NASA and Non-NASA Applications

The end result of this research program will be a set of fuels that are simultaneously high performance and non-toxic. These fuels will have application for not only in NASA's propulsion systems but also in a range of military aerial warfare and tactical surface systems, missile defense, and commercial launch systems.

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