Active Project (2016 - 2016)

Additively Manufactured Monolithic Catalyst Bed for Green Propellants, Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

ABSTRACT

This proposal aims to develop a low cost, high efficiency catalyst technology to address navigation and maneuver difficulties in NASA's return missions. Our approach takes advantage of two recent innovations in the space industry regarding green monopropellants and additive manufacturing (AM). In the proposed project, we are to design and fabricate a monolithic catalyst bed using selective laser melting (SLM) technology and begin to optimize its catalytic performance with new green monopropellants like AF-M315E and LMP-103S. The overwhelming advances that these two areas have seen in the last few years are making it possible to offer a novel solution to the problems that robotic exploration missions are currently facing. Our proposed solution will enhance thruster life, decrease the risk of catalyst bed failure, and lower the cost of green monopropellant subsystems used in small spacecraft. Our proposed project has two main objectives. First, we will demonstrate the additive manufacture of a monolithic W-Re catalyst substrate that combines high flow area and high internal surface area, to insure high reactivity and low pressure drop. Then, we will begin to develop a thorough understanding of the HAN and ADN chemical behavior at a molecular level, in order to precisely tailor the Ir/Pt/Re catalyst material formulation for maximum catalytic reactivity.

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: NASA applications include future spacecraft, satellites, and space-borne instruments and telescopes. All have requirements for active attitude control, an area expected to begin the regular use of green monopropellants within the next decade.

To the commercial space industry:

Potential Non-NASA Commercial Applications: The Department of Defense has all of the same kinds of uses as in the NASA

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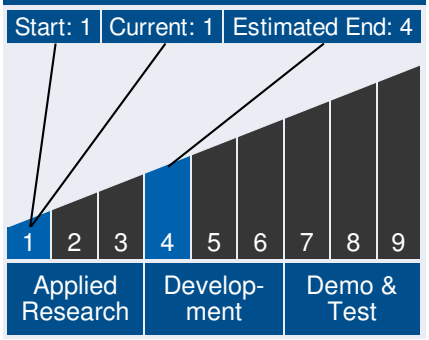
Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

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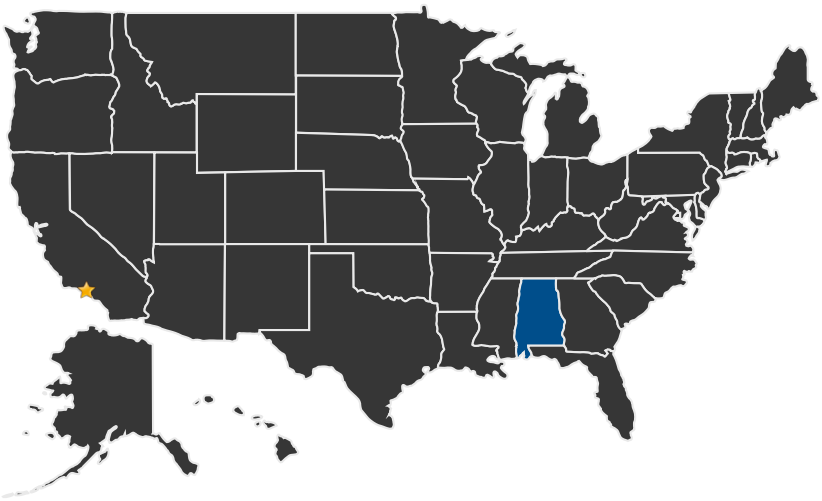
applications, but our primary focus is in missile defense divert and attitude control systems (DACS).

U.S. WORK LOCATIONS AND KEY PARTNERS



U.S. States With Work

Lead Center:
Jet Propulsion Laboratory

Other Organizations Performing Work:

- Arctic Slope Technical Services, Inc. (Huntsville, AL)

PROJECT LIBRARY

Presentations

- Briefing Chart
  - (http://techport.nasa.gov:80/file/23619)

Management Team *(cont.)*

Principal Investigator:

- Junia Melin

Technology Areas

Primary Technology Area:
In-Space Propulsion Technologies (TA 2)
└ Chemical Propulsion (TA 2.1)
  └ Liquid Storable (TA 2.1.1)

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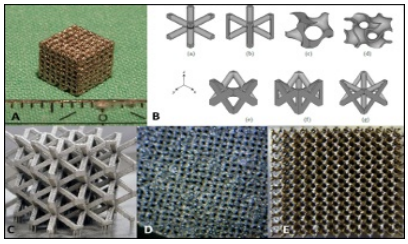
IMAGE GALLERY



Additively Manufactured Monolithic Catalyst Bed for Green Propellants, Phase I

DETAILS FOR TECHNOLOGY 1

Technology Title

Additively Manufactured Monolithic Catalyst Bed for Green Propellants, Phase I

Potential Applications

NASA applications include future spacecraft, satellites, and space-borne instruments and telescopes. All have requirements for active attitude control, an area expected to begin the regular use of green monopropellants within the next decade.