

Diamond_Copper Materials Based Solution for Improved Engine Performance, Phase I Project

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



ABSTRACT

A Narloy-Z-diamond particulate composite providing increased thermal conductivity and light weight will be developed for use in liners for liquid rocket engine thrust chamber designs at similar cost to NarloyZ. Shortcomings of previous copper-diamond products have been poor resistance to thermal cycling and high cost. In the current work, attention will be given to developing a strong, chemically bonded metallurgical interface between the copper alloy and diamond phases to resist thermal cycle damage under operational conditions for the thrust chamber

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: Improved rocket nozzle liners for LOX/methane engine designs to replace existing high thermal conductivity materials such as Narloy Z with 50% increased thermal conductivity , lighter weight at similar cost . This approach can be used for any liquid rocket engines including heavy lift. Improved heat exchanger design for environment control for manned spaceflight

To the commercial space industry:

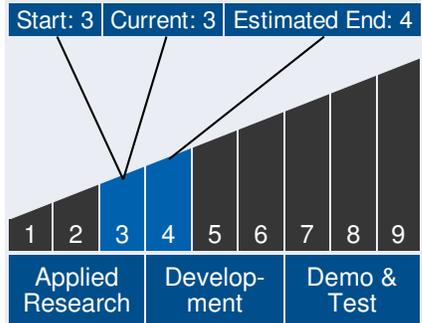
Potential Non-NASA Commercial Applications: Thermal management of electronic devices such as improved heat sinks and spreaders for motor drives CPUs, power electronics and photonics to replace existing Cu/Mo/Cu and copper tungsten composites,



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Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

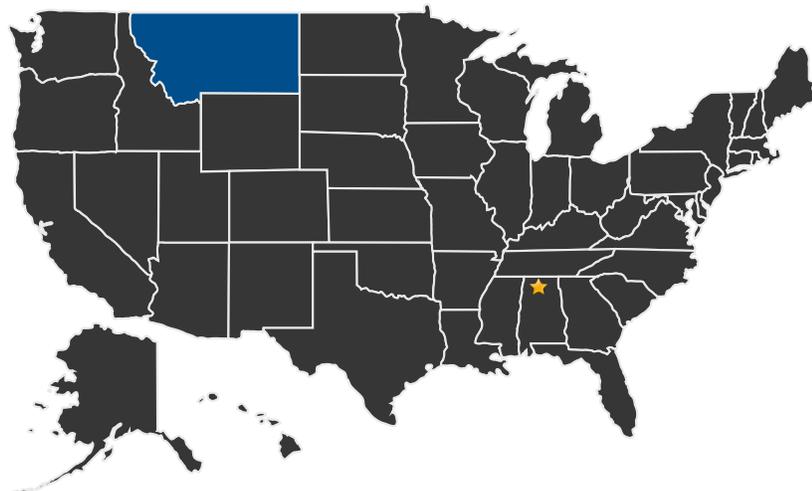
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U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States
With Work

★ **Lead Center:**
Marshall Space Flight Center

Other Organizations Performing Work:

- Global Technology Enterprises, Inc. (Bozeman, MT)

PROJECT LIBRARY

Presentations

- Briefing Chart
 - (<http://techport.nasa.gov:80/file/23343>)

Management Team *(cont.)*

Principal Investigator:

- Todd Johnson

Technology Areas

Primary Technology Area:

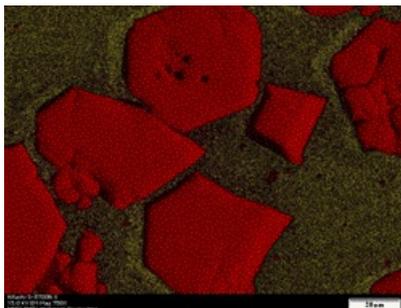
- In-Space Propulsion Technologies (TA 2)
 - └ Chemical Propulsion (TA 2.1)
 - └ Liquid Cryogenic (TA 2.1.2)

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IMAGE GALLERY



Diamond_Copper Materials Based Solution for Improved Engine Performance, Phase I

DETAILS FOR TECHNOLOGY 1

Technology Title

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Potential Applications

Improved rocket nozzle liners for LOX/methane engine designs to replace existing high thermal conductivity materials such as Narloy Z with 50% increased thermal conductivity , lighter weight at similar cost . This approach can be used for any liquid rocket engines including heavy lift. Improved heat exchanger design for environment control for manned spaceflight