



Where Manufacturing Technology and Talent Matter

# Request for Proposal

## *Hypersonic Material Acceleration II*

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## **Program Abstract**

LIFT utilizing a Navy Other Transaction Authority (OTA) Public Private Partnership seeks increased hypersonic materials development of ICME (Integrated Computational Materials Engineering) as a critical core competency for the Navy. LIFT has invested in and developed a significant ICME hypersonic capability and infrastructure via team projects proposing a two-pronged rapid design of advanced future generation materials and manufacturing processes for application in the time frame beyond 2025. Through initial program efforts, LIFT developed significant capability with ICME for ceramics and additively manufactured metallics subjected to hypersonic conditions. This capability will be extended to ceramic matrix composites (CMCs) produced via traditional methods.

**Period of Performance: 24 months**

## **Hypersonic Material Acceleration II – Hypersonic Modeling**

Task 1 Team Kick-Off

Task 2 Identify a CMC and metallic test specimen geometry that meets the requirements of the test facility (size and mounting), instrument/sensors (shape/surface finish, space claim), modeling & simulation plan (thermal/structural response), and manufacturing method (geometry, volume, orientation, post processing).

- Generate one or more initial concept geometries based upon engineering judgement to best meet all requirements
- Predict heat flux from simulations of preliminary exterior shape
- Use FE modeling and pre-defined nominal hypersonic boundary conditions to identify the specimen geometry to achieve project requirements by tuning relevant parameters
- Concept review and iteration with LIFT and hypersonic testing partners.

Task 3 Develop and deliver hypersonic models predicting the performance of a CMC structure, e.g., C-SiC, and a metallic structure produced by large deformation processing in a hypersonic reacting flow. Perform iterative improvements to the hypersonic model(s) to achieve reasonable parity with physical test results.

- Work with LIFT to identify mutually agreeable software package(s), programming languages, and data structures for hypersonic modeling and simulation efforts
- Demonstrate reasonable parity of CMC and metallic models with physical test articles
- Delivery of models to LIFT by project completion



- Task 4 Collaborate with and support LIFT & LIFT member partner(s) responsible for multi-scale, multi-physics modeling of the CMC and metallic material
- Chemistry-process-structure-property ICME relationships developed from LIFT & LIFT member partner(s) will support, in part, the hypersonic modelling effort
- Task 5 Final report outlining model development and road map effort required to extend toolset developed in this effort to other CMCs and metallics



## Expectation of a LIFT Project Partner

- Open to all LIFT members
  - All project consortium members must be a LIFT member in good standing for award
  - Non-members may submit proposals but must join membership as appropriate
- Regular communications/summaries to be provided by the partner, including:
  - Weekly review updates
  - Quarterly reports
  - Final Report
- Demonstration of International Traffic in Arms Regulations (ITAR) Compliance. As such, only US persons may work on this program.
- Development research is expected to be accomplished internally, without the use of subcontractors

## Deliverables

- Financial Proposal
- Timing Plan
- Resource plan

*Note: Responding to this Request for Proposal for services does not require the provider to be able to support the entire request. Should there be aspects that cannot be supported, simply note those on the proposal.*

Submission Due Date: August 19, 2022

Submission forum: LIFT submission portal <https://lift.technology/project-calls/>

## Contact Information

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