H8.01  Low-Earth Orbit Platform and Microgravity Utilization for Terrestrial Applications

Lead Center: JSC

Participating Center(s): ARC, GRC, JPL, KSC, LaRC, MSFC

Scope Title

Use of the International Space Station (ISS) to Foster Commercialization of Low Earth Orbit (LEO) Space

Scope Description

Background: The White House letter to the appointee for the Office of Space Technology Policy included a number of significant challenges from the President that are intended to ensure the United States is "the world leader in the technologies and industries of the future that will be critical to our economic prosperity and national security." These challenges can be addressed through continued NASA investment in new and promising commercial In-Space Production Applications (InSPA) that utilize the ISS National Lab (ISS NL). NASA has been investing in such commercial technologies for many years, including through use of Small Business Innovation Research (SBIR) topic H8, and is seeing great possibilities for the commercial in-space production of materials that can be made in microgravity to levels of performance and quality that exceed those made on Earth. These technologies not only help to maintain and strengthen U.S. leadership in this area, but they support development of a strong U.S.-led commercial space economy in LEO.

Scope: This subtopic seeks proposals that advance NASA’s objective of leveraging the unique capabilities (microgravity, exposure to space) of the ISS to maintain and strengthen the U.S. leadership in the area of commercial in-space production of materials, technologies, and industries of the future that will be critical to our economic prosperity amid increasing global competition. Proposals should describe how the commercial technologies benefit from the space environment to produce a level of quality and performance superior to that which is possible on Earth, while also supporting NASA’s objective to catalyze emerging markets leading to a broad non-NASA demand for use of U.S.-based LEO commercial destinations in the future. Of specific interest are proposals that could lead to valuable terrestrial applications and foster a scalable and sustainable demand for commercial markets in LEO. Use of the ISS will facilitate validation of these applications and enable development of a commercial product at reduced cost in order to attract significant capital and lead to growth of new and emerging LEO commercial markets in the following areas: thin-layer deposition, crystal production, tissue engineering and regenerative medicine, and advanced materials production. Phase I proposals for this subtopic should include increased emphasis (beyond the suggested page limit) on the anticipated business case as defined in Part 7 (The Market Opportunity) of this SBIR Solicitation. This subtopic is not intended for use by applications seeking a TRL 9 flight demonstration for a system or technology not aligned with in-space production goals.

Expected TRL or TRL Range at completion of the Project: 3 to 6
Primary Technology Taxonomy:
Level 1: TX 12 Materials, Structures, Mechanical Systems, and Manufacturing
Level 2: TX 12.4 Manufacturing

Desired Deliverables of Phase I and Phase II:

- Research
- Analysis
- Prototype
- Hardware
- Software

Desired Deliverables Description:

For Phase I, as a minimum, development and test of a bench-top prototype and a written report detailing evidence of demonstrated prototype technology in the laboratory or in a relevant environment and stating the future path toward hardware demonstration in orbit. A preliminary assessment of the technology business case (cost and revenue forecast, market size, potential customers, etc.) is also required.

Desired deliverables at the end of Phase II would be a preliminary design and concept of operations, development and test of an engineering development unit in a relevant environment (ground or space), and a report containing detailed science requirements, results of testing, and an updated business case analysis and/or application plan. Concepts that can achieve flight demonstration on a suborbital flight or on the ISS during Phase II are especially valuable.

State of the Art and Critical Gaps:

The ISS is being used to stimulate both the supply and demand of commercial marketplace as NASA supports the development of the LEO space economy, while being aligned with the national goal to ensure the United States remains a world leader of in-space manufacturing and production of advanced materials.

Relevance / Science Traceability:

This subtopic is in direct support of NASA’s recent policy to enable commercial and marketing activities to take place aboard the ISS. The ISS capabilities will be used to further stimulate the demand for commercial products development and strengthen U.S. leadership in in-space manufacturing and production.

References:

3. Center for the Advancement of Science in Space, Inc. at: [https://www.issnationallab.org](https://www.issnationallab.org) and [In-Space Production Applications (issnationallab.org)](https://www.issnationallab.org). Both links are external.
4. President's Letter to Dr. Eric Lander (OSTP Nominee): [A Letter to Dr. Eric S. Lander, the President's Science Advisor and nominee as Director of the Office of Science and Technology Policy | The White House](https://www.whitehouse.gov).