

# Electrolytic Method for Tungsten Coating of Uranium Oxide Spheres, Phase I Project

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



## ABSTRACT

Tungsten clad uranium dioxide spheres are deemed an enabling technology for nuclear thermal propulsion. Current research has mainly focused upon chemical vapor deposition (CVD) technologies to apply the tungsten cladding. Although good progress has been made with this technique, the process still requires improvements to lower the impurity content, increase throughput and lower operating cost, . Reactive Innovations, LLC (RIL) proposes to develop an electrolytic process for coating high purity tungsten metal onto uranium dioxide spheres economically. The process is performed at ambient pressure and is expected to provide a uniform, dense, and adherent coating. The Phase I effort will lead to demonstrating the electrolytic deposition of tungsten onto surrogate spheres. The coating will be evaluated for thickness, uniformity, and adhesion. A manufacturing cost model will be established for the process and a pathway to large scale economic production will be outlined. The Phase II effort is envisioned to further improve and characterize the coating's properties in terms of process capability, evaluate coated spheres in a suitable hydrogen environment, perform thermal cycling tests, scale the fabrication process, and provide coated material to NASA for evaluation.

## ANTICIPATED BENEFITS

### To NASA funded missions:

Potential NASA Commercial Applications: The proposed technology's main focus is for use in producing fuel for nuclear thermal propulsion systems. These systems are more fuel efficient than chemical rockets and much lighter. This results in an enabling technology for long duration space flight (e.g. Mars) and the feasibility of multiple short duration flights (e.g. cargo trips to the moon). Additional benefits include limiting exposure of personnel and equipment to harmful radiation.

### To the commercial space industry:

Potential Non-NASA Commercial Applications: The proposed

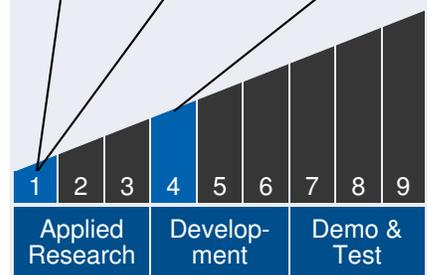


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## Technology Maturity

Start: 1 | Current: 1 | Estimated End: 4



## Management Team

### Program Executives:

- Joseph Grant
- Laguduva Kubendran

### Program Manager:

- Carlos Torrez

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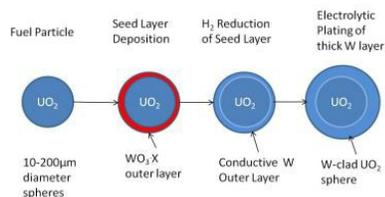


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## IMAGE GALLERY



*Electrolytic Method for Tungsten Coating of Uranium Oxide Spheres, Phase I*

## DETAILS FOR TECHNOLOGY 1

### Technology Title

Electrolytic Method for Tungsten Coating of Uranium Oxide Spheres, Phase I

### Potential Applications

The proposed technology's main focus is for use in producing fuel for nuclear thermal propulsion systems. These systems are more fuel efficient than chemical rockets and much lighter. This results in an enabling technology for long duration space flight (e.g. Mars) and the feasibility of multiple short duration flights (e.g. cargo trips to the moon). Additional benefits include limiting exposure of personnel and equipment to harmful radiation.