NASA SBIR 2018 Phase I Solicitation

H7.03 Plasma Jet Printing Technology for Printable Electronics in Space

Lead Center: ARC

Participating Center(s): MSFC

Technology Area: TA12 Materials, Structures, Mechanical Systems and Manufacturing

This emerging alternative needs further maturation before it can be used in space missions. Common inks and dispersions used in inkjet printing and aerosol systems must be usable in plasma jet printers with proper nebulizers for extended deposition times. Throughput vs. plasma cylinder/nozzle diameter needs to be optimized with possibility of multiple nozzles that can be arranged in a showerhead configuration either to increase throughput or mix various types of feedstock for alloy-type materials.Â

In Phase I, a print head that can print materials using plasma and tailor oxidation states of materials should be developed. The print head should have an integrated fluid delivery system that can work in microgravity environment and should use low weight power supply.Â A preliminary prototype printer demonstrating basic features of plasma printing is a preferred deliverable.Â

In Phase II, the technology should be advanced by showing capability of printing a wide range of materials including organics, inorganics and others.Â The system also should be advanced by using appropriately sized electrical components, flow controllers etc. for meeting space operation needs and including an enclosure for trapping any airborne materials that would ensure safe use in closed environments such as the International Space Station.Â

Atmospheric pressure plasma jet systems have cross cutting applications in sterilization and plasma treatment of surfaces as well. Phase II should demonstrate in-situ resource utilization applications of the plasma jet including in-space printable electronics, removal of biological contaminations in science tools, etc.Â The completed system at the end of the effort should have integrated hardware and software.