An End-To-End Microfluidic Platform for Engineering Life Supporting Microbes in Space Exploration Missions

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OBJECTIVES

The Phase II STTR effort seeks to build a miniaturized prototype specifically designed and engineered for future NASA manned space exploration missions. Specifically, the Phase II prototype will enable the automation of many synthetic biology processes including: plasmid preparation, cell culturing, selection, and growth monitoring, genetic screening, and product screening. The successful development of the microfluidic automation technology with a miniaturized platform will lay the groundwork for life supporting waste management and in situ resource utilization capabilities in future NASA manned space exploration missions.

ACCOMPLISHMENTS

NOTABLE DELIVERABLES PROVIDED
The Phase II prototype consisting of 3 modules: 1) microfluidic incubation, 2) microfluidic product screening, and 3) microfluidic genetic screening.

KEY MILESTONES MET
Both key Phase II milestones are met: 1) expanding the Phase I microfluidic automation capability to enable automated, metabolic engineering and screening of microbes for enhanced production of products important for in-situ resource utilization in NASA missions, and 2) designing and building the Phase II prototype, capable of automation of many synthetic biology processes including plasmid preparation, cell culturing, selection, and growth monitoring, genetic screening, and product screening.

FUTURE PLANNED DEVELOPMENTS

PLANNED POST-PHASE II PARTNERS
JBEI

PLANNED/POSSIBLE MISSION INFUSION
Enhanced production of food and fuels, processing of waste products such as CO2 or urea, atmosphere regeneration, and water re-utilization on the International Space Station.

PLANNED/POSSIBLE COMMERCIALIZATION
Biofuel production, Drug development, and Agricultural development

CONTRACT (CENTER) NNX15CA23C (ARC) SOLICITATION-PHASE STTR 2014-II
SUBTOPIC T6.01 Synthetic/Engineering Biology for NASA TA 7.1.3 Consumables Production

TRL

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