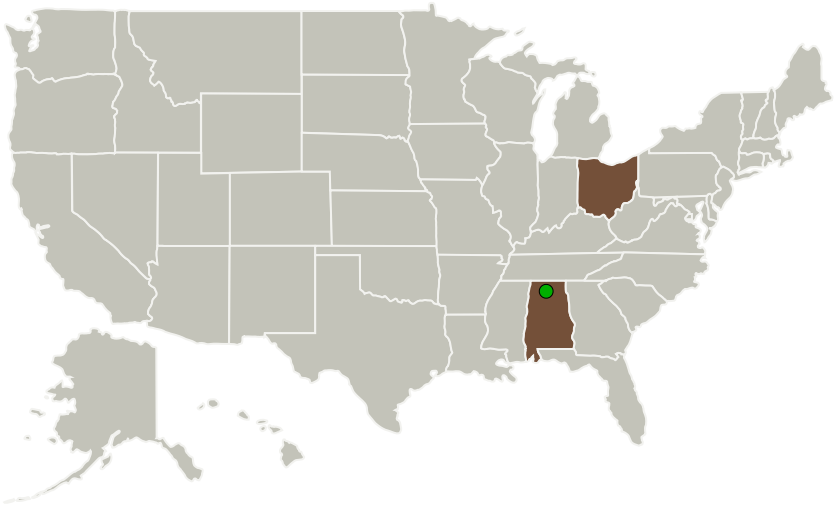
Reversible Copolymer Materials for FDM 3-D Printing of Non-Standard Plastics, Phase I

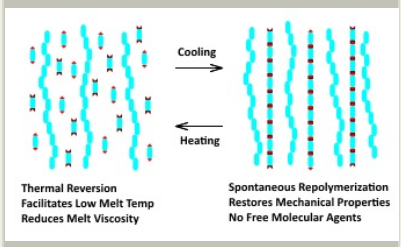
Completed Technology Project (2015 - 2015)

Project Introduction

Cornerstone Research Group Inc. (CRG) proposes to design and develop thermally-reversible polymeric materials that will function to modify the reprocessing characteristics of current packaging plastics to provide compatibility to Fused Deposition Modeling (FDM) type 3-D printing. The application of thermally-reversible polymers combined with a plastic recycling, blending, and extrusion process would allow current and future packaging materials to be processed into a copolymer blend filament suited to the 3-D printing system. This will provide NASA with a means to generate 3-D printer feedstock from on-hand packaging plastics without the need for separate 3-D printer raw material payloads. CRG has already demonstrated the efficacy of thermally-reversible bond structures in commercial adhesive applications, and the proposed concept not only has the potential to enable reclamation and 3-D printing from currently employed packaging materials, but to advance the state-of-the-art in 3-D printing materials technology. CRG's proposed approach to develop thermally-reversible polymer materials to modify current packaging solutions, and demonstration of recycling of those packaging materials into a 3-D printable filament, will provide NASA with a material and processing technology readiness level (TRL) of 3 at the conclusion of the Phase I effort.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Cornerstone Research Group, Inc.	Lead Organization	Industry	Miamisburg, Ohio
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Ohio

Project Transitions

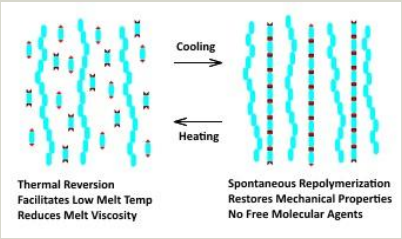
June 2015: Project Start

December 2015: Closed out

Closeout Summary: Reversible Copolymer Materials for FDM 3-D Printing of Non-Standard Plastics, Phase I Project Image

Closeout Documentation:
- Final Summary Chart Image*(https://techport.nasa.gov/file/139888)*

Images



Briefing Chart Image
Reversible Copolymer Materials for FDM 3-D Printing of Non-Standard Plastics, Phase I *(https://techport.nasa.gov/image/136343)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Cornerstone Research Group, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

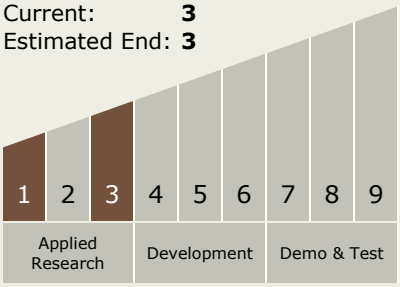
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Joseph Althaus

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - └ TX07.2 Mission Infrastructure, Sustainability, and Supportability
    - └ TX07.2.2 In-Situ Manufacturing, Maintenance, and Repair

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System