Plasma Processes

Production of Mature Highland Lunar Regolith Simulant

SBIR STTR

PI: Dr. Daniel Butts, Plasma Processes, LLC, Huntsville, AL, Contract No. NNX11CH51P

Identification and Significance of Innovation

•High fidelity lunar simulants are needed to verify lunar operations and the efficiency/life span of equipment and processes to be used on the lunar surface, during manned and/or unmanned missions.

•One significant limitation of current simulants is the lack of agglutinates, which often contain nano-phase iron.

•During Phase I, a plasma processing technique was explored to enhance the fidelity of NU-LHT-2M Highland simulant.

•Characterization confirmed the process yielded nano-phase iron containing glassy and agglutinate-like phases, which resemble those observed in actual lunar soils.

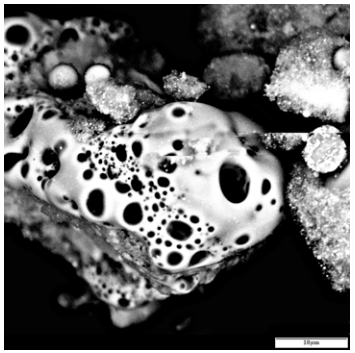
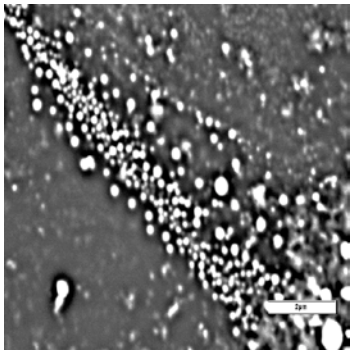


Image of agglutinate-like simulant particle producing by plasma processing NU-LHT-2M



Higher magnification image showing elemental iron particles with diameters <100 nm

Phase II Technical Objectives and Work Plan

•During a Phase I, Plasma Processes explored a method to enhance the fidelity of NU-LHT-2M Highland simulant. A Phase II effort is essential to further the development and fully optimize the production process. Proposed objectives/work plan is as follows:

- Task I – Increase Glass Phase Content
- Task II – Produce Higher Fidelity Agglutinate Particles
- Task III – Fully Characterize Simulant Material
- Task IV – Increase Production Rate
- Task V – Investigate Alternative Highland Simulants

NASA and Non-NASA Applications

•High fidelity lunar simulant for lunar process and equipment verification

•Powder metallurgy products, protective coatings, catalysts, sintering aids, microfiltration membranes, rocket fuel additives, fuel cell technologies, low-cost titanium production

Firm Contacts

PI: Daniel Butts, dbutts@plasmapros.com

Bus: Angela Hattaway, ahattaway@plasmapros.com