NASA SBIR/STTR Technologies

Mass Production of Mature Lunar Regolith Simulant

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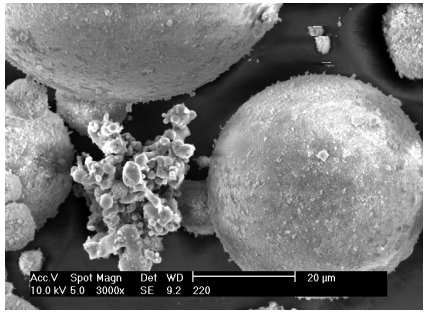
Identification and Significance of Innovation

• High fidelity lunar regolith simulants are needed to verify the performance of equipment, mechanisms, structures and processes to be used on the lunar surface.

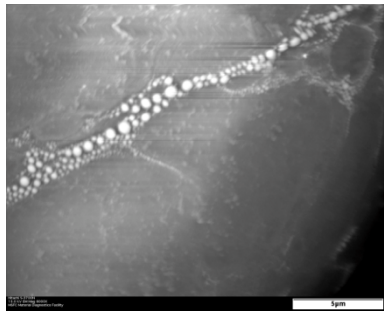
• One significant limitation of current simulants is the lack of constituents such as agglutinates and volcanic glasses which often contain nano-phase iron.

• Using plasma spray technology, PPI has refined a technique that produces agglutinates and glassy constituents, with nano-phase iron, from JSC-1A feedstock.

•However, current production rate is limited and does not meet NASA's target of 30ton/yr at a cost of <$60,000 for high fidelity simulants.



Plasma processed JSC-1A showing agglutinate and volcanic glassy analog particles.



Higher magnification image of nano-sized beads confirmed to be BCC Fe via TEM electron diffraction.

Technical Objectives and Work Plan

•Technical Objective – Expand current plasma spray technology to an economical, large-scale production process to manufacture simulant glassy agglutinates and spherules. Specifically, agglutinates and glassy phases resulting from plasma processed JSC-1A lunar simulant will be mixed with unprocessed JSC-1A to produce a derivative simulant.

• Task I – Investigate Avenues to Increase Production

• Task II – Down-select & Implement Process Modifications

•Task III – Evaluate Processed Material

NASA and Non-NASA Applications

• Feedstock for development of in-space fabrication of Si-solar cells; Al, Ti, Fe. Oxygen production for life-support, habitat and propulsion use, high fidelity lunar simulant for dust, abrasion, mining & excavation research.

• Powder metallurgy products, protective coatings, catalysts, sintering aids, microfiltration membranes, rocket fuel additives, electronics, fuel cell technologies

Firm Contacts

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NON-PROPRIETARY DATA