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**Identification and Significance of Innovation**

- High fidelity lunar simulants are needed to verify the efficiency and 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 (both Mare and Highland) is their low fidelity (i.e. lack of mature constituents such as agglutinates containing nano-phase Fe)
- PPI has developed a plasma processing technique to enhance the fidelity of Mare simulant - JSC-1A
- However, considering roughly 87% of the Lunar surface consists of Highland regolith composition, mature Highland simulants are also of great interest

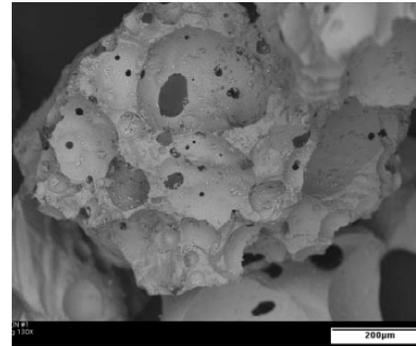
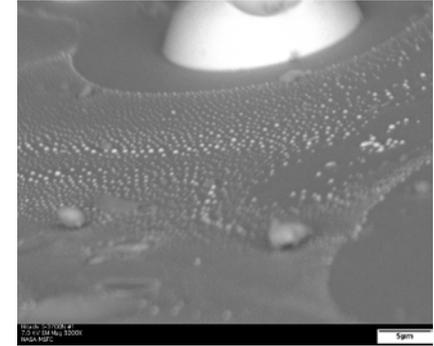


Image of Mare agglutinate simulant particle producing by plasma processing JSC-1A



High magnification image of agglutinate particle showing elemental Fe particles with diameters ranging from nanometers to micrometers

**Phase I Technical Objectives and Work Plan**

- The primary technical objective of the proposed Phase I effort is to expand the current Mare simulant fidelity enhancement technology to the production of high fidelity Highland simulants. Specifically, Highland agglutinate particles will be produced by plasma processing Highland simulants. By mixing these agglutinate particles with the root simulant in the correct proportions, the combination yields a high fidelity derivative Highland simulant.
- Task I – Highland Agglutinate Simulant Production Trials
- Task II – Characterize Simulant Material
- Task III – Investigate Mass Production Processes

**NASA and Non-NASA Applications**

- High fidelity Highland lunar simulant for lunar process and equipment verification
- Powder metallurgy products, protective coatings, catalysts, sintering aids, microfiltration membranes, rocket fuel additives, electronics, fuel cell technologies

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