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519 Industrial Scale Manufacturing of Lunar Simulant Components From Oxides with Remotely-Coupled Transferred Arc Plasma

Friday, May 22, 2009: 2:20 PM

Blossom (Renaissance Cleveland Hotel)

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Lunar simulants are a core requirement with applications across many NASA and commercial space exploration programs. Most lunar simulants available for research are made from mined materials. These materials are then sized and blended to match the desired properties. The starting chemistries are essentially the same for the finished product. Contaminates, such as Chlorine and excess Sodium, can cause experimental challenges and differences in final material performance.

Zybek has developed a process for creating 'synthetic' minerals from low-cost, commercially available oxides. For example, ZAP is manufacturing AN100 Anorthite ($\text{CaAl}_2\text{Si}_2\text{O}_8$) from commercially-available batch ingredients (i.e., CaO , Al_2O_3 , SiO_2). The batch ingredients are mixed in proper ratios and brought to molten temperatures by a transferred arc plasma. The molten material is then cooled with a means that promotes crystal growth. The crystals are then milled with a Pulse mill that breaks material along grain. The resulting material size is 1 to 500 micron. If a glass is required, the molten material is quenched rapidly.

The process has also been demonstrated for other materials, including: Albite / Anorthite blends, Augite, Pigeonite, Fayalite, and synthetic Ruby.

The plasma-based process and pulse mill used to manufacture lunar simulants and dust materials will be discussed in the presentation. Data on the final chemistries of these synthetic minerals will be presented along with photos of the grain structure.

See more of: [Characterization of Lunar Regolith and Simulants](#)

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