Regolith Beneficiation System for Production of Lunar Calcium and Aluminum

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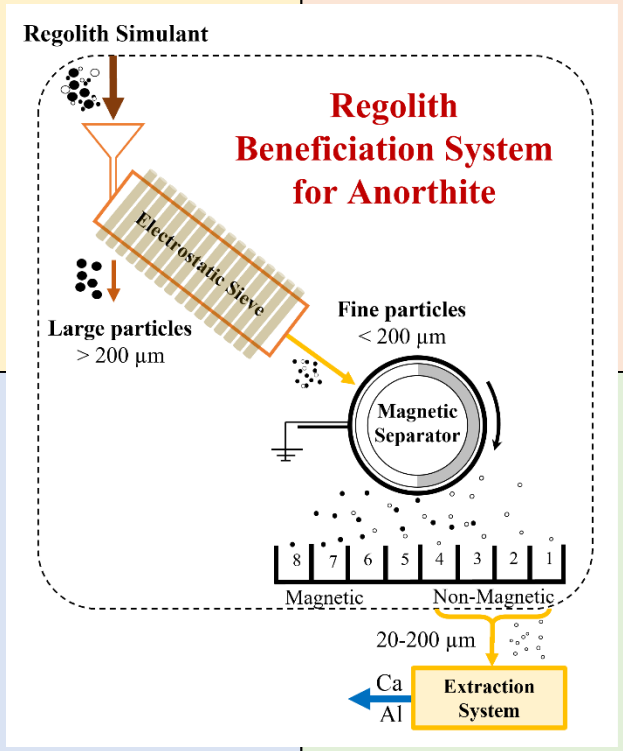
Development Objectives

- Build and demonstrate integrated system for particle size classification and enrichment of anorthite from lunar mare and highland simulants with varying agglutinate fractions.
  - TRL4 → TRL5
  - Output >70 wt% anorthite, particles 20-200 µm
  - Final system <0.51 m^3, 35 kg, 300 watts
  - System throughput ≥3 kg/hr



Approach

- Develop and test sub-systems:
  - electrostatic sieve
  - magnetic drum separator
- Under operational conditions:
  - -196°C to 120°C
  - ambient & vacuum pressure
  - representative test materials
- Integrate into complete system, validate vacuum performance
- Optimize size, mass, and power needs of integrated system.

Impact and Infusion

- Enables efficient processing to extract calcium and aluminum from lunar regolith
- Direct application to ISRU and construction materials anywhere on lunar surface
- TRL6 achievable within 2 years
- TRL8 achievable within 5 years