

Microwave vacuum sintering of lunar mare regolith simulant LMS-1 for lunar construction

Monday, 31 August 2026 16:50 (20 minutes)

Lunar regolith can be used for construction of infrastructure such as landing pads, habitats and scientific labs required to support long-term future lunar surface missions. This study investigates microwave sintering of lunar regolith simulant, LMS-1, targeting three applications: (1) thermally insulating functional materials and (2) pellets as process materials in molten-salt electrolysis for oxygen and metal extraction - both applications require materials with high porosity and reasonable strength. For the construction of (3) landing/launching pads, the structural materials must have higher strength and density. Sintering is one of the proposed construction methods to form regolith structures of varying strength. It offers higher energy efficiency than melting. Microwave heating of materials provides volumetric heating and has significant advantages. However, microwave sintering poses significant challenge of temperature control inducing non-uniform temperature gradients. Lunar regolith and simulants are good absorbers of microwave energy at 2.45 GHz. Recent studies have demonstrated high energy savings and homogenous temperature distribution in susceptor-assisted (or hybrid) microwave heating of lunar soil simulants. Here, we demonstrate the experimental results of susceptor-assisted microwave sintering of LMS-1 in vacuum and characterize the products for porosity and microstructure analysis to understand the mineralogical changes governing the sintering process.

Professional Status of the Speaker

Postdoc

Interest in submitting a paper in a special issue of

No interest

Invitation letter for visa

No

Author: Dr LEVIN PRABHU, Vibha (European Space Resources Innovation Center, Luxembourg Institute of Science & Technology, Luxembourg)

Co-authors: Dr HARRIES, Dennis (European Space Resources Innovation Center, Luxembourg Institute of Science & Technology, Luxembourg); Dr HADLER, Kathryn ((1) European Space Resources Innovation Center, Luxembourg Institute of Science & Technology, Luxembourg, (2) University of Luxembourg, Luxembourg)

Presenters: Dr HARRIES, Dennis (European Space Resources Innovation Center, Luxembourg Institute of Science & Technology, Luxembourg); Dr LEVIN PRABHU, Vibha (European Space Resources Innovation Center, Luxembourg Institute of Science & Technology, Luxembourg)

Session Classification: Microwave sintering

Track Classification: Group 3: Microwave sintering