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Abstract

**Scaleup of Microwave Powder Bed Fusion for Lunar Infrastructure Construction**

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NASA and its partners are seeking to establish a sustainable and permanent presence on the Moon. Like explorers on Earth, making use of natural resources upon arrival at the destination will be paramount. In-situ resource utilization of the lunar regolith will enable efficient construction of lunar infrastructure. Transforming the granular regolith into a solid can be achieved in many ways. One method is to use microwave energy to sinter the regolith into various structures. The lunar regolith has a low thermal conductivity, but microwaves can volumetrically heat it to bind the granular particles together in an energy efficient manner. One concept that is being developed and evaluated to sinter the regolith into infrastructure uses the Moon’s surface as a powder bed. Regolith would be added to the sintered lunar structure to build up layers to create structures such as landing pads, blast shields, roads, etc. Microwave systems, concept of operations, and sintering protocols are being developed to create a sub-element structure targeted for a lunar demonstration mission.