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COSMIC RAY SHIELDING PERFORMANCE EVALUATION OF MICROWAVE SINTERED KLS-1 LUNAR REGOLITH SIMULANT BLOCKS

Abstract

With the upcoming Artemis missions, humans will return to the Moon for long-term crewed exploration. However, the lunar surface presents challenges for habitation due to direct and continuous exposure to Galactic Cosmic Ray (GCR) particles, attributed to the absence of atmosphere and a lunar magnetic field. To facilitate sustained human presence and exploration on the lunar surface, the need for infrastructure with effective GCR shielding becomes is imperative. Lunar regolith, abundant on the Moon's surface, is gaining considerable attention as an in-situ resource for constructing the essential infrastructure. Among various technologies, microwave sintering of lunar regolith stands out as a promising method for efficient infrastructure construction, distinguished by its energy efficiency, rapid and uniform heating, broad applicability, and independence from additives. This paper introduces the manufacturing process employing microwave sintering and presents a cosmic ray shielding performance assessment of sintered KLS-1 lunar regolith simulant blocks. The blocks, measuring 10 cm * 10 cm * 5 cm, are evaluated for its effectiveness in mitigating gamma-ray exposure with increasing density. This research may contribute to the development of infrastructure conducive to prolonged human habitation and exploration on the lunar surface.