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3D PRINTING OF MOON HIGHLANDS REGOLITH SIMULANT

Abstract

The purpose of this paper is to evaluate the feasibility of 3D printing of Moon regolith simulant specifically selected to have a composition similar to that of Lunar Highlands Terrain type. This work is a validation of the results already obtained by other researchers with the simulant JSC-1A and serve the purpose to provide wider knowledge on the additive manufacturing with Moon in-situ resources using the simulant NU-LHT-2M. The technology adopted in this study is the Selective Laser Melting (SLM), supported by granulometry analysis of the powder and SEM imaging and microanalysis of the material before and after processing to assess the chemical composition variation and structure modifications. The properties of the printed parts were tested using a Vickers microindenter, a hydraulic press coupled with a load cell and a thermovacuum chamber. The results obtained confirm the feasibility of SLM with Moon Highlands regolith simulant using energy densities ranging from 2.96 to 4 J/mm² obtaining small printed parts with average surface hardness of 695HV and compressive strength of 22,7MPa suggesting possible future applications of this technology in the fabrication of objects and, if opportunely scaled, even small buildings.