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EXPERIMENTAL RESULTS OF SOLAR WIND HELIUM IMPLANTATION INTO LUNAR REGOLITH SIMULANT

Abstract

Research is ongoing to develop an experimental volatiles extraction system that can demonstrate a heating process for releasing helium-3 (3He) and other valuable lunar volatiles from lunar regolith. Beyond the Apollo and Luna lunar soil samples, there is no regolith or regolith simulant implanted with solar wind volatiles that is available. A device has been developed to implant helium into batches of JSC-1A simulant. The device, named the Solar Wind Implanter (SWIM), uses a voltage difference between planar electrodes to accelerate helium ions (up to the average solar-wind speed of 450 km/s) into a thin, falling sheet of regolith simulant. The SWIM device has been assembled and initial implantation tests have been conducted. The SWIM device is being calibrated by performing tests to measure electrode current under varying operating parameters and measure the dose and temperature release pattern of helium in implanted samples. These experimental results are presented in what follows. The research presented here is supported by a NASA Space Technology Fellowship Program Grant.