Abstract #803

English

Utilizing Molten Regolith Electrolysis Reactors to Produce Oxygen on the Moon

We present a parametric sizing model of a Molten Regolith Electrolysis (MRE) reactor to produce oxygen and molten metals from lunar regolith. A multiphysics simulation of the reactor, including electrochemistry and thermodynamics, is leveraged to generate a wide tradespace of high-fidelity reactor designs. This multiphysics simulation is integrated into an MRE reactor model to predict the mass, power, and size of the reactor given a set of design constraints and performance goals. This reactor sizing model is utilized to generate reactor designs for a number of operational scenarios, including supporting outposts near the lunar poles as well as the equatorial regions. An integrated ISRU system model is used to size the power system, excavator, hopper, feed system, and oxygen liquefaction/storage systems required to support an MRE reactor on the lunar surface. The first-order feasibility of utilizing an MRE reactor to produce oxygen and molten metals on the lunar surface is evaluated.

French

No abstract title in French

No French resume

Author(s) and Co-Author(s)

Mr. Samuel Steven Schreiner
NASA Space Technology Research Fellow
MIT

Dr. Laurent Sibille
Senior Technology Development Scientist
ESC – Team Vencore, NASA Kennedy Space Center

Dr. Jesus A Dominguez
Senior Engineer
ESC – Team Vencore, NASA Kennedy Space Center

Dr. Jeffrey A Hoffman
Professor of the Practice
MIT

Mr. Gerald B Sanders
In-Situ Resource Utilization Chief Engineer
NASA Johnson Space Center