

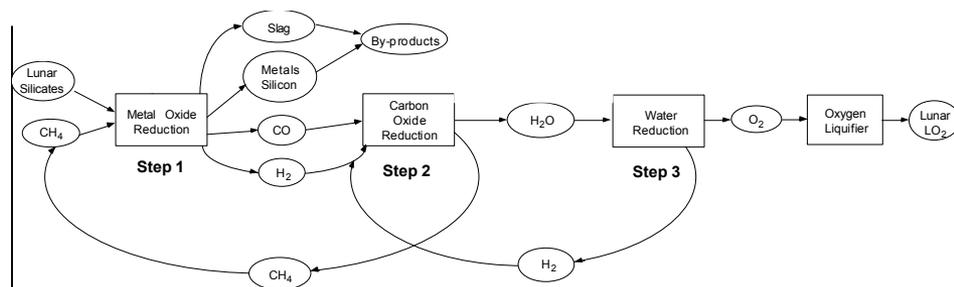
Carbothermal Lunar Regolith Processing System (CLRPS)

PI: Robert Gustafson/Orbital Technologies Corporation-Madison, WI

Proposal No.: 02-I H2.01-7744

Identification and Significance of Innovation

ORBITEC proposes to develop an integrated carbothermal lunar regolith processing system (CLRPS) to produce oxygen and a variety of other useful materials to support future lunar exploration activities. The CLRPS utilizes carbothermal reduction of regolith via a direct energy source to extract oxygen, silicon, iron, ceramics, and other useful by-products from lunar regolith. The CLRPS concept eliminates many of the problems found with other lunar oxygen production approaches, such as the continuous need for high-temperature containers from Earth, reagents that are consumed during processing, and extensive beneficiation of the lunar regolith prior to processing.



Three-Step Carbon-Based Reduction Process for Lunar Oxygen and Metal Production

Technical Objectives

- Define the CLRPS system requirements
- Design and build prototype a CLRPS unit
- Characterize the performance of the prototype CLRPS unit
- Investigate Possible Heating Sources for the CLRPS
- Develop a preliminary design for a bench-top CLRPS unit that would be built, tested, and delivered to NASA in Phase II

Work Plan

1. Define CLRPS System Requirements
2. Develop Prototype CLRPS Unit
3. Testing Prototype CLRPS Unit
4. Evaluate Alternate Carbothermal Reduction Energy Sources
5. Preliminary Phase II Design
6. Reporting

NASA Applications

Efficient and reliable production of oxygen and metals on the Moon will enhance and/or enable a variety of solar system exploration programs by providing a very cost-effective supply of oxygen in addition to other raw materials. The CLRPS products would be used for life support, propellants, solar cells (Si), electric wire or metal parts (Fe) and other infrastructure development (e.g. ceramics/bricks, fibers for composites, etc.).

Non-NASA Applications

Development of technologies required for the processing of carbon monoxide could lead to methods of removing carbon monoxide and carbon dioxide from the atmosphere, and in support of reducing harmful emissions from waste streams in terrestrial processes.

Contact Information

Mr. Robert Gustafson, Proposed Principal Investigator
608-827-5000, 608-827-5050 FAX, gustafsonr@orbitec.com