Preparation and Characterization of Platinized Electrodes for Use in Oxygen Extraction from Lunar Regolith

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Lunar oxygen is an important resource for returning humans to the moon. One process for supplying oxygen to the lunar surface is in situ processing of the lunar regolith using ionic liquids. In order to extract the oxygen electrolysis is used. A prime candidate for the electrode is platinum because it is highly conductive and resistant to corrosion. Oxygen production rate is proportional to the electrode surface area. The process of platinization involves electrochemically adhering a coating of higher surface area platinum black to the platinum electrode. Cyclic voltammetry was used to compare the amount of current between two electrodes. It was found that the current between blackened electrodes can be as much as a factor of 100 greater than the current between unblackened electrodes.

Introduction

Ionic liquids are used to break down lunar regolith into a solution of water and metal.

The water is separated and electrolysis is performed using platinum as the electrode materials to separate the oxygen and hydrogen for collection.

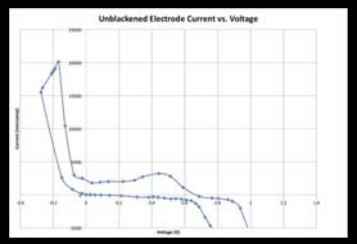
Procedure

Platinum sheets are prepared and cleaned by heating the platinum to 1000°C to remove any material on the surface

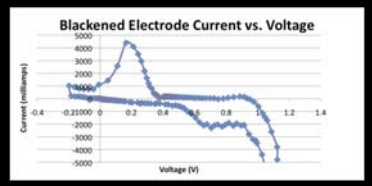
The platinum electrodes are placed in a solution of chloroplatinic acid and lead acetate. Two volts are run through the system to coat one of the electrodes with platinum black. By using an alternating current both electrodes can be blackened.

Results

A



B



Graph A shows the current of the unblackened electrode in micro amps vs. voltage and graph B shows the current in the blackened electrode in milliamps vs. voltage. It can be seen that the blackened electrodes produce significantly greater currents which will lead to a higher oxygen generation.

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