Paper ID: 79538
student

26th IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (A5)
Deep Space Habitats and Resources (4)

Author: Ms. Molly Kirkpatrick
Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia,
molly.kirkpatrick@csiro.au

DEVELOPMENT OF NOVEL SENSING CAPABILITY FOR ISRU RESOURCE CHARACTERISATION

Abstract

he manufacture of large structures in cislunar space is currently prohibitively expensive due to the high launch cost of materials from Earth. One method to increase the economic and technical viability of space-based construction is through the use of lunar In-Situ Resource Utilisation (ISRU) to provide the required resources from lunar regolith. In conventional terrestrial mineral processing operations, monitoring and control systems are essential to maintain the efficiency and efficacy of the process. In a similar way, the success of ISRU approaches in a planetary context relies on the development of sensing technologies that can characterise and assess the properties of lunar regolith.

This paper describes the development of a new, miniaturised elemental sensor specifically designed for astrometallurgical ISRU operations. The sensor capabilities were evaluated by measuring the elemental composition of lunar regolith simulants that had undergone magnetic separation. Using the feed, magnetic concentrate, middlings and non-magnetic resource streams, it was shown that it is feasible to automatically generate resource information for assay in real-time. This outcome demonstrates that such an approach could be used to perform on-stream assay before and after beneficiation to support remote ISRU mineral beneficiation processes.