Paper ID: 59914
oral

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 3 (2C)

Author: Mr. Stephan Kalapis
RWTH Aachen University, Germany

ANALYSIS OF FIBRES FROM LUNAR REGOLITH SIMULANTS AND THEIR COST EFFICIENCY

Abstract

After more than 48 years of the last moon landing, mankind is striving to get back to the moon: New technologies and space programs make it possible not only to return to the moon but also to stay there permanently. For astronauts to be able to live and work on site, a lot of infrastructure and logistics are required. Ideally, the technologies for living and working on the moon complement each other, creating synergy effects. In order to enable self-sufficient life on the lunar surface, a technology is needed that can be used to process raw materials available on the moon into materials for a wide variety of applications. Such ISRU (In Situ Resource Utilisation) applications will become indispensable on the Moon to support a colony not only in everyday life but also to provide processed material in emergency situations. Such a technology is being developed in the MoonFibre project at RWTH Aachen University. In the first stage the regolith is prepared and fibres are produced from regolith and energy. In a second stage, these fibres can be processed into a wide range of fibre-based materials. Within this paper the lunar regolith simulant used in the MoonFibre project is analysed and the spinning process for fibre production is explained. The fibres obtained in this spinning process are examined in more detail with respect to their physical properties. Further processed materials such as nonwovens or fabrics made of MoonFibres are presented and analysed in more detail. With the knowledge gained here about the produced basalt fibres, the first rough structures are designed. Finally, it will be presented whether the use of a spinning plant on the lunar surface is financially profitable and thus represents a business case. By the one-time transport of a fibre production plant on the moon, further protracted and expensive transports of materials to the moon's surface can be saved.