

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

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END-TO-END MISSION DESIGN FOR MICROBIAL ISRU ACTIVITIES AS PREPARATION FOR A  
MOON VILLAGE**Abstract**

One first necessity for a lunar settlement is to determine the potential of elemental extraction and utilization methods in situ. In this study, all requirements to test a novel, biological approach for ISRU are validated, and an end-to-end mission architecture is designed. The general mission consists of a lander with a fully autonomous bioreactor able to process lunar regolith and extract elemental iron. The elemental iron could either be stored or directly utilized to generate iron wires or construction material. To maximize the success rate of this mission potential landing sites for future missions are studied and technical details (thermal radiation, shielding, power-supply) are analyzed. The final chapter will assess the potential mission architecture (orbit, rocket, lander, timeframe) as well as a cost estimation. This design might not only be one step further towards an international moon village but may also enable similar missions to ultimately colonize Mars and further explore our solar system.