

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Life Support, habitats and EVA Systems (7)

Author: Ms. Diana Pawlicki
University of Lodz, Poland

Mr. Mateusz Balka
Stockholm University, Poland

BIOCOMPOSITES FOR STRUCTURAL DESIGN IN SPACE - MYCELIUM MATERIALS AND
MWALLD CONCEPT**Abstract**

Prolonged stay in space, including concepts such as the colonisation of Mars or other bodies, requires the construction of living space. Idea of shipping materials from Earth has been long mostly abandoned, in favour of ISRU, which is the topic of this work, focusing on current trends in fungal material production and future perspectives. Locally sourced regolith may and should be the core ingredient, along with novel technologies based on biotechnological advancements such as microbe-derived products. Production of construction materials with usage of filamentous fungi and bacteria leads to components of varying qualities, with possibilities of fitting into a desired usage case - early research stages propose using fungi and bacteria composite materials as an alternative to particle boards, with similar approach being used to produce different materials such as textiles, foams, furniture, protective packaging, wood-like materials, and even construction material prototypes, on Earth. The most common way of producing fungi-based materials is by filling molds with the inoculated feed-stock and incubating such molds until the fungus spreads inside. A novel approach is to use 3D printing with the inoculated feed-stock to construct various shapes that can be incubated keeping the printed shape. Such an approach eliminates the need to produce molds beforehand and makes it possible to produce large and irregular objects such as whole buildings by using a printer only. Importantly, by joining with bacteria and bacteria-derived products, the technology, along with microbial 3D printing, could allow construction materials of increased endurance and additional qualities, the core concept of mWALLd.