

19th IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE (D4)  
Contribution of Moon Village to Solving Global Societal Issues (2)

Author: Ms. Kristin Neidlinger  
SENSOREE Therapeutic Biomedica, United States, Kristin@sensoree.com

Dr. Michaela Musilova  
International MoonBase Alliance, United States, musilova@moonbasealliance.com

ALGAE TEXTILE AND BIOPLASTIC KIT FOR SPACE TRAVEL AND SUSTAINABLE LIVING  
APPLICATIONS FOR THE FUTURE OF WELLBEING

**Abstract**

Textile based wellness is a global need. As skin absorbs directly from the environment, ten percent of the chemicals in clothing transfer to the skin and body. What if we obtained vital nutrients like oxygen and vitamins directly with our textiles? This would have significant implications for the sustainability of human space travel. Current research shows algae as a lifeform suitable for growing in space orbit. It is small and weightless, and can be grown and implemented as a material resource from soft textiles to sturdy plastics. It also can be composted or reconstituted into new shapes and designs. For this research, an algae based bioplastics and textiles kit was created for testing for space applications during the fourth EMMIHS analog lunar mission (February 1-15, 2020) at the Hawaii - Space Exploration Analog and Simulation (HI-SEAS) habitat in Hawai'i, USA. It was part of a collaboration between the EuroMoonMars initiative by ILWEG, the International Moonbase Alliance and HI-SEAS. For the simulation, a closed loop DIY kit for growing and composting Algae Textile for space habitats was studied. Soft textiles to hard plastics were iterated in the controlled air environment for potential use in space travel. It was found that astronauts may create unique textiles with oxygen prolific health benefits. The textiles have the potential to act as a portable source of photosynthesis, as well as be a sensor to record stress levels and note correlations with atmospheric events. It is possible to extract time dated scientific data at the end of the study to gain insights on the human wellbeing during the mission. Finally, the textile may be composted then repurposed. The fabric may also be infused with the wearers' DNA to become a surrogate skin to record growth and environmental stresses of microgravity, acting as an agent to check for the effects of travelling. As space travel is known to cause DNA and RNA degeneration, there is potential to counteract hardships with chlorella's healthy effects for detoxification and cell regeneration. As algae has a high potential as a material for space usage, further testing of DNA in combination with algae will be meaningful. Research into how it responds to microgravity is limited, but the stresses have been known to provoke epigenetic evolutions. Further research should be incorporated into analog and real space missions, and will also provide valuable insight for the longevity of coexisting sustainably on Earth.