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Author: Dr. Agata Kolodziejczyk
Astronomia Nova Society, for Science Foundation, Poland, fichbio@gmail.com

BACTERIAL CELLULOSE FOR CLOTHES PRODUCTION IN SPACE USING KOMBUCHA
MICROBIAL CONSORTIUM.

Abstract

Kombucha is one of the most popular microbial consortium tested in space and simulated space conditions [1]. It consists of multispecies bacterial component producing bacterial cellulose and multispecies fraction of yeasts producing probiotic brewing [2]. Bacterial cellulose can be used in multiple forms such as paper, bandage, threads, electrophoretic membranes and clothes [3].

Here we tested three different microbial consortia regarding chemical and physical properties. We tested native kombucha, kombucha with added purple bacteria *Rhodobacter sphaeroides* and kombucha with added cyanobacteria *Synechocystis sp. PCC6803*. Bacterial cellulose was transformed into fabric by lyophilization process or air drying (Fig.1). FTIR, ion leaching, membrane interaction with water and SEM methods were employed to determine biological, chemical and physical properties of obtained bacterial cellulose. We characterized and compared critical parameters for cellulose production: mass, energy, transparency, thickness, acidity, vitality and biocontamination. Obtained bacterial celluloses were tested during simulations of space missions by analog astronauts in the Lunares habitat in forms of wrist- and armbands. Sweat absorption and interaction with skin was analyzed.

Our results suggest that kombucha can be used for clothes production in space. Simple breeding, strong resistance for deleterious space environment and multifunctional application of kombucha consortium make this microbial population the best candidate for *in situ* nanocellulose production.

Literature:

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