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

Author: Dr. Jan Grosser
German Aerospace Center (DLR), Germany, jan.grosser@dlr.de

Mr. Joachim Lenic
German Aerospace Center (DLR), Germany, Joachim.Lenic@dlr.de
Dr. Sergey Kharin
SSC RF-Institute of Biomedical Problems RAS, Russian Federation, charin@imbp.ru
Mr. Dmitry Tsarkov
SSC RF-Institute of Biomedical Problems RAS, Russian Federation, mityachan@gmail.com
Mr. Yuri Smirnov
Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS), Russian Federation, yusmirnov@imbp.ru
Dr. Natalia Novikova
Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS), Russian Federation, novikova@ibmp.ru
Dr. Lana Moukhamedieva
Institute for Biomedical Problems, Russian Federation, post@imbp.ru
Dr. Michael Dolch
Hospital of the Ludwig-Maximilians-University, Germany, Michael.Dolch@med.uni-muenchen.de
Mr. Viktor Fetter
Airbus DS GmbH, Germany, viktor.fetter@airbus.com
Mr. Thomas Hummel
Airbus DS GmbH, Germany, thomas.hummel@airbus.com
Dr. Ulrich Reidt
Airbus DS GmbH, Germany, ulrich.reidt@airbus.com
Dr. Andrei Kornienko
Airbus Defence and Space - Space Systems, Germany, Andrei.Kornienko@astrium.eads.net
Mr. Robin Nitzer
Airbus Defence and Space, Germany, robin.nitzer@airbus.com
Dr. Andreas Helwig
Airbus Group Innovations, Germany, andreas.helwig@airbus.com
Mr. Peter Roth
Airbus DS GmbH, Germany, peter.p.roth@airbus.com

E-NOSE: MEASURING SURFACE MICROBIAL CONTAMINATION AND OXIDATIVE STRESS OF COSMONAUTS – RESULTS AND FUTURE APPLICATIONS

Abstract

The E-Nose project comprises of two types of measurement devices operated in the Russian segment of the International Space Station (ISS). One E-Nose is used to identify microbial contamination on surfaces inside the ISS. Such contaminations like fungi or bacteria pose a risk for the health of the crew and

can degrade or destroy the affected surfaces by biologically induced corrosion. The second device called E-Nose Breath Gas is a modification of the aforementioned device in order to study changes in volatile organic compounds (VOCs) contained in the breath gas associated with e.g. oxidative stress. In a two-step process the cosmonaut first exhales in a mask where the VOCs are collected in tubes with sorbent material. In a second step the VOCs are released by heating up the tubes. A gas flow with the released VOCs is then fed through an adapted E-Nose to determine the type and concentration of the VOCs. The E-Nose was launched in December 2012 to the ISS and used in three campaigns covering approximately five months. Later, in March 2016 an improved air sampler and a lancet sampling device for the E-Nose was launched to the ISS , the latter to be used to identify contaminations in areas hard to access (behind racks or panels). Measurements were successfully taken during 9 campaigns and on different targets. The test data can be downlinked for further processing on ground. To identify the type of the microbial contamination by its individual "smell" a reference database was set up by performing measurements on selected cultivated strains on ground. This database contains 20 microorganisms (13 non-pathogenic and 7 pathogenic strains). The E-Nose Breath Gas is currently in production and qualification. Its launch to the ISS is foreseen beginning of 2019. The presentation gives an overview on the evolution of the E-Nose projects, summarizes the main results obtained so far and gives a prospect of planned future steps including ground-based applications of E-Nose devices.