

IAA/IAF SPACE LIFE SCIENCES SYMPOSIUM (A1)  
Life Support, habitats and EVA Systems (6)

Author: Mr. Yegor Morozov

Institute of Biophysics, Russian Academy of Sciences, Siberian Branch; Siberian State Aerospace University, Russian Federation, transserfer89@gmail.com

Dr. Sergey Trifonov

Institute of Biophysics, Russian Academy of Sciences, Siberian Branch; Siberian State Aerospace University, Russian Federation, trifonov\_sergei@inbox.ru

Dr. Sofya Ushakova

Institute of Biophysics, Russian Academy of Sciences (RAS), Siberian State Aerospace University, Russian Federation, ubflab@ibp.ru

Dr. Yurii A. Kudenko

Institute of Biophysics, Russian Academy of Sciences (RAS), Siberian State Aerospace University, Russian Federation, ykudenko@yandex.ru

Prof. Alexander A. Tikhomirov

Institute of Biophysics, Russian Academy of Sciences, Siberian Branch; Siberian State Aerospace University, Russian Federation, alex-tikhomirov@yandex.ru

INCLUSION OF THE SEDIMENT OBTAINED AS THE RESULT OF MINERALIZATION PROCESS  
OF HUMAN METABOLITES INTO THE BTLSS MATTER TURNOVER

**Abstract**

Increasing ways of material cycle closure of biological-technical life support systems (BTLSS) are being researched. The original method of organic wastes wet incineration in hydrogen peroxide developed at IBP SB RAS in order to make recycling fertilizer had a tough problem. About 5-6 g/l of hardly dissoluble sediment precipitated after the initial process, making more than a half of such essential nutritive elements as Ca, Mg, P, etc. remained unavailable for plants grown on hydroponics thus falling out of turnover as deadlock products. Possible ways of dissolving the sediment were researched. Sediment secondary incineration in HNO<sub>3</sub> + H<sub>2</sub>O<sub>2</sub> 1:1 appeared to be the most promising. Introduction of new technology, using only substances synthesized inside the system matter flows, allowed making more than 90% of each considered nutritive element available in irrigation solution thus returning them to matter turnover. Salad plants were grown as the test objects on irrigation solutions prepared from “wet incineration” products. Considering that all plant nutrition has been prepared from the human metabolites’ portion obtained after consumption of the corresponding plants’ amount has shown increase of crop yield more than twice as compared to the previous technology, thanks to introduction of new technological process.