MICROGRAVITY SCIENCES AND PROCESSES (A2)
Fluid and Materials Sciences (2)

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UKRAINIAN PROGRAM FOR MATERIAL SCIENCES IN MICROGRAVITY

Abstract

The aim of the report is to present previous and current approach of Ukrainian research society to the prospect of material sciences in microgravity. This approach is based on analysis of Ukrainian program of research in microgravity, preparation of Russian - Ukrainian experiments on Russian segment of ISS and development of new Ukrainian strategy of space activity for the years 2010-2030. Two parts of issues are discussed: (i) the evolution of our views on the priorities in microgravity research (ii) current experiments under preparation and important ground-based results. (i) The concept of "space industrialization" and relevant efforts in Soviet and post – Soviet Ukrainian research institutions are reviewed. The main topics are: melt supercooling, crystal growing, testing of materials, electric welding and study of near-Earth environment. The anticipated and current results are compared. (ii) The main experiments in the framework of Ukrainian-Russian Research Program for Russian Segment of ISS are reviewed. Flight installations under development and ground-based results of the experiments on directional solidification, heat pipes, tribological testing, biocorrosion study is presented. Ground-based experiments and theoretical study of directional solidification of transparent alloys are reviewed as well as preparation of MORPHOS installation for study of succinonitrile – acetone in microgravity.