

IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)  
Science Results from Ground Based Research (4)

Author: Prof. Kalashnikov Evgenii  
Ioffe Physico-Technical Institute, Russian Federation, ekevkalashnikov1@gmail.com

THE EFFECT OF WEIGHTLESSNESS ON THE STATE OF THE SOLUTION AND THE GROWTH  
OF CRYSTALS FROM SOLUTIONS IN THE MELT (OR THE EFFECT OF WEIGHTLESS  
CONDITIONS ON THE PROCESSES OF METABOLISM AND GROWTH (SOLIDIFICATION OF  
PROTEIN MOLECULES)/ EROSI

**Abstract**

Planning long-term flights in weightlessness involves understanding the processes that occur in organisms. A living organism in weightlessness, the processes of metabolism and growth (solidification of proteins) / dissolution (erosion) of bone tissues in it, are directly related to the behavior of solutions, delivery of the necessary components to the right place and time, including to the emerging boundaries of the partition. This situation is quite well modeled by the processes of crystal growth of chemical compounds from solutions-melts. In the works [1,2] and in the references in them, studies of the growth of crystals of chemical compounds from solutions in melts were carried out. In particular, it was shown that the state of the solution-melt in weightlessness is significantly different from the earth's conditions. - Crystals grown in weightless conditions are in a strained (stretched) state in relation to the same crystals grown in terrestrial conditions, have a more defective structure. The state of a liquid-like solution in zero gravity is described. From the new phase kinetics growth equations, the pressure in the solution and the stresses in the elements of the new phase formed in weightless are found. [1] Kalashnikov E.V., Gurin V.N., Nikanorov S.P., Yagovkina M.A., Derkachenko L.I., Stress relaxation in  $\text{CrSi}_2$  crystal grown under microgravity conditions from Zn melt in the Cr - Si - Zn system. *Technical Physics Letters*, 2019, V.45, N7, p.687–689. [2] Kalashnikov E.V., Gurin V. N., Nikanorov S.P., Nikolaev L.I., Stress relaxation in  $\text{CrSi}_2$  crystal grown under microgravity conditions from Zn melt in the Cr - Si - Zn system. *Technical Physics*, 2020, V90, N.2, p.197 – 202.