ANALYSIS OF MICROCRATERS IN MATERIALS SPECIMENS AFTER LONG-TERM EXPOSURE ON ISS SURFACE

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The "Komplast" experiment has been carried out on the ISS by the Khrunichev Space Center jointly with other Russian scientific centers since 1998. The experiment incorporates the "Komplast" cartridges on the FGB exterior, which are fitted with materials specimens and sensors. The cartridges were sent into orbit together with FGB on 20 November 1998. In March 2011, two of the cartridges were taken back from the ISS by the "Discovery" American space shuttle after being exposed in the open space for 12 years.

In the framework of this experiment the subject of analysis is the effect of the space environment on the exposed specimens of various materials.

This report covers the analysis results of the surface morphology of various materials taken from the "Komplast" cartridges exposed to hits of micrometeors and micronic particles of space debris. Analysis is made of microcraters of 5 to 250 mcm in specimens of polished metals and silicone comprised in the sensor for micrometeoric particles.

The report represents optic and scanning electron microscope images of craters formed in the specimens by high-velocity and low-velocity particles impacting the surface. By virtue of the electronic microscope, data on composition of the substance in the craters and of the substance of the low-velocity particles are obtained. The data make it possible to differentiate the particles as the natural-origin particles or anthropogenic-origin space debris particles.

Distribution of craters and low-velocity particles in the size range of 5 to 50 mcm is obtained. The data are compared with the existing models of fluxes of natural-origin and artificial-origin microparticles on the ISS orbit. Inhomogeneous particles of complicated configuration are discovered on the surface of the analyzed specimens, whose origin are not uniquely determined and are to be the subject of further study.