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Damage surfaces of copper, niobium and titanium under micrometeorites impact

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Structure of near-crater regions of copper, niobium and titanium samples exposed in the outer space was studied. Flat Cu, Nb, Ti specimens 1 cm×1 cm and 1 mm thickness were placed on the out-side surface of "MIR" space orbit station and exposed during 1.5 year. The samples than was studied by scanning electron microscopy with X-ray analysis.

The experimental results of laboratory simulation of high speed collision of hard micro-particles with metal target^[1] shows that craters and so-called micro-crater fields are formed. The formation of the micro-crater fields is explained by dissipation of the shock waves energy of arising while collision of supersonic particle with target material, which takes place on the structural, and phase inhomogeneities of the surface layer. It has been marked^[2] that the formation of a crater is accompanied by emission of high-temperature and density plasma which being distributed along the surface of the specimen can also damage the surface of the material. Effect of plasma on metal surface leads to formation of structure content from small craters located along direct lines outgoing from main crater. The formed structure essentially increase the destruction area.

References

- [1] Nikitushkina O. N. *et al.* Physics and chemistry of materials treatment. 2001. 1. 48-51.
- [2] Nikitushkina O. N. *et al.* Physics and chemistry of materials treatment. 2002. 2. 21-25.