

THE FIRST FINDING OF THE METAL ALUMINUM PARTICLES IN THE LUNAR SOIL. N.A. Ashikhmina, O.A. Bogatkov, A.I. Gorshkov, A.V. Mokhov, V.G. Obronov, D.I. Frikh-Khar. Inst. Ore Deposits Geology, Petrography, Mineralogy and Geochemistry, USSR Acad. of Sci., Moscow.

The metal aluminum particles have been found in the 2003-4, 8 base sample (0,20-0,45 mm fraction) delivered by the "Luna-20" automatic station. Their sizes are 0,1; 0,15 and 0,2 mm. The particles are flat, somewhat elongated in one direction, malleable, light-grey with dull surface. Fresh fracture is silvery-white with the strong metallic lustre. On the particles surfaces there are the step furrows elongated and curved in accord with the particles shape and the crusts and the compact accumulations of the colourless and milk-white matter.

For the detailed study of the fragments has been used the microprobe "Camebax" and the translucent electron microscope IEM-100C with the microprobe attachment "Kevex-ray" (energy dispersion spectrometer).

The secondary electron scanning of the fragment surface revealed the system of the parallel furrows against background of which stand out the elongated (often bent) and isometric crystals. The system of the parallel furrows in all probability reflects the step relief of the aluminum particles surfaces.

The electron microscope transillumination of the thinned lunar metallic particle revealed the bending extinction contours. The estimate of the electron-diffraction patterns of the metal particles gave the parameter (a) of the face-centered cubic lattice cell equal to  $4,05\overset{\circ}{\text{A}}$ , which is practically identical to that of the syntetical aluminum. The micro X-ray spectrum analysis of the metal plate made directly in the electron microscope with help of the "Kevex-ray" attachment established in it only Al.

The spirit suspension preparations of the matter covering the fragments surfaces were studied under the electron microscope. The microdiffraction study of the revealed pseudohexagonal, rounded and square microcrystals permitted to establish that they

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belong to halite and sylvite. The sylvite and halite often form the intergrowths with the strictly parallel orientation of their lattices. Na, Cl, K were accordingly determined in such intergrowths.

In the preparations were also revealed the plates of amorphous glass. They contain Si (the main part), K, Fe, Al, Na.

Under the earth's conditions the native aluminum formation in the magmatic processes is difficult because of the relatively high oxygen potential. However, on the Moon the necessary physico-chemical conditions can be realized with the greater probability.

The formation of the metal aluminum as well as the other native elements in the lunar soil is presumably related to the lunar exogenetic processes. It is assumed that under influence of protons and the other cosmic radiation particles took place the destruction of the crystal lattice of the rock fragments among which at the "Luna-20" landing site prevail the high Al anorthosite fragments. With that the surface was being enriched by the reduced to the elemental state aluminum side by side with the other elements. The following segregation and isolation of the reduced aluminum atoms in the form of the metallics most likely are due to the impact processes which are witnessed by the presence of the silicate glasses in the studied fragments.

## References:

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