STRUCTURAL FEATURES OF WEATHERED DRONINO METEORITE.

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Introduction: Meteorites are subjected to weathering process in the terrestrial conditions. The structure and composition of meteorites may be influenced by various environmental factors and microorganisms. The structural variations in Aliskerovo IIIAB and Bilibino IIAB iron meteorites caused by terrrestrial conditions were discussed earlier [1]. Dronino iron meteorite has a terrestrial age of about 1000 years. This meteorite was found in swamp and, therefore, was affected by water, salts and other chemical compounds as well as bacteria. This fact was the reason of the study of the weathered Dronino iron meteorite.

Experimental: Two polished sections of Dronino Iron-ung meteorite fragments were prepared for various analysis. Chemical analysis was carried out using X-ray photoelectron spectroscopy (XPS) with ULVAC-PHI VersaProbe 5000. All samples were investigated by means of scanning electron microscopy (SEM) using FESEM ΣIGMA VP with energy dispersion spectroscopy (EDS) and electron backscattering difraction (EBSD).

Results and discussion: SEM analysis of the studied section of Dronino meteorite demonstrated duplex structure similar to previous results [2]. It was observed that metal grains with a high Ni content and average sized of about 5 micrometers were in a low Ni phase matrix. The traces of γ-Fe(Ni) phase dissolution was found inside these grains. There were found a lot of large inclusions of troilite and products of troilite alteration in this meteorite fragments. SEM analysis of sulphur-bearing mineral inclusions in kamacite matrix of Dronino meteorite showed the presence of the transition areas. Each area can be visually divided in subareas related to the level of kamacite oxidation. The most close subarea to the inclusion boundary consisted probably of fully oxidized kamacite and unaltered metal grains with a high Ni content. The next subarea was supposed as a mixture of partially oxidized kamacite and above mentioned unaltered grains. The subarea which was close to the kamacite matrix boundary had likely the traces of the initial kamacite oxidation. The average thickness of observed transition areas was approximately 200 µm. XPS analysis demonstrated the presence of Fe^{3+} at the surface of the studied fragment. This fact was in agreement with previous results obtained using Mössbauer spectroscopy [2] that different FeOOH polymorph forms were considered as the main iron containing components in the oxidized part of Dronino meteorite. An additional possible process of ferric hydrous oxide formation from troilite was suggested by Velbel in [3]. Traces of organic matter in weathered surface of Dronino meteorite fragment were detected by XPS.

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