**IDENTIFICATION AND STUDY OF ROALDITE IN SIKHOTE-ALIN IIAB USING EBSD METHOD**

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**Introduction:** Nitrogen as one of potentially prebiotic elements [1] is presented in limited amount of extraterrestrial minerals. For example, large inclusions of high temperature condensate osbornite (TiN) was revealed in CH/CH Isheyevo chondrite [2]. Osbornite associated with sulfide was revealed in Pillistfer EL6 enstatite chondrite. However, extraterrestrial metallic minerals containing the largest amount of P and N are the main providers of these elements to the Earth [1]. Roaldite $(Fe,Ni)_4N$ like rabdite $(Fe,Ni)_3P$ was exsolved from metal saturated with N and was identified in Jerslev IIAB, Youndegin IAB-MG, Toluca IAB-sLL, Odessa-IAB-MG, Sikhote-Alin IIAB using transmission electron microscopy, electron diffraction [3] and SIMS [4]. However, roaldite revealing is too difficult due to its morphology similar to rhabdite and Neiman bands, especially in the case of its size is less than 1 µm. In the present work we applied the EBSD (electron back-scattered diffraction) method for identification and study of roaldite in Sikhote-Alin coarse octahedrite.

**Methods:** Individual fragments of Sikhote-Alin meteorite studied in the present work were collected by the Ural State Technical University – UPI expedition in 1986. The sample's areas which included potential precipitates of roaldite were marked with microhardness imprints. The sample was polished using standard metallographic polishing procedure followed by polishing using 0,04µm $SiO_2$ for 2 hr. EBSD studies were accomplished using JEOL JSM-6490LV SEM outfitted with EBSD unit from HKL Technology with Channel 5 software. Additionally we used the program CaRIne Crystallography 3.1 for obtaining stereographic projections and modeling the crystals structure.

**Results and Discussion:** Scanning of the area including possible roaldite step by step allowed us to obtain the phase contrast map and the pole figures. $(Fe,Ni)_4N$ is confidently identified in coarse octahedrite Sikhote-Alin IIAB using EBSD method. The phase contrast map demonstrated the presence of kamacite, rabdite and roaldite. $Fe_4N$ in the marked areas was easily revealed on these maps and clearly differed from the Neiman bands and precipitations of rabdite. Roaldite exsolves in kamacite in the form of thin platelets of 0,3-2,0 µm thick and up to several millimeters long. While analyzing the pole figures obtained by EBSD, it was determined that the planes $\{110\}_{roaldite} || \{111\}_{kamacite}$ and the directions $<1\text{-}11>_{roaldite} || <101>_{kamacite}$, $<10\text{-}1>_{roaldite} || <11\text{-}1>_{kamacite}$, and that both lattices have close <001> directions. Also $<010>_{roaldite} || <\text{-}110>_{kamacite}$ with small misorientation (less that 1 deg), that lies in good agreement with orientation correlation between nitride $Fe_4N$ and ferrite in industrial alloys. The character of roaldite morphology in Sikhote-Alin meteorite indicated that this mineral was formed after rabdite precipitates were already exsolved.

**References:** [1] M. Pasek, D. Lauretta, 2008. *Orig. Life. Evol. Biosph.* 38:5-21. [2] V.I. Grokhovsky. 2006. *Meteoritics & Planetary Science* 41:A68. [3] H.P. Neilsen, V.F. Buchwald, 1981. *Proc. Lunar Planet. Sci.* 12B:1343-1348. [4] N. Sugiura, 1998, *Meteoritics &Planetary Science, 33, 393-409.*