American Mineralogist, Volume 85, pages 1082–1086, 2000

Florenskyite, FeTiP, a new phosphide from the Kaidun meteorite

ANDREI V. IVANOV,[1] MICHAEL E. ZOLENSKY,[2] AKIHIRO SAITO,[3] KAZUMASA OHSUMI,[3] S. VINCENT YANG,[4] NATALIYA N. KONONKOVA,[1] AND TAKASHI MIKOUCHI[2,5]

[1]Vernadsky Institute of Geochemistry and Analytical Chemistry, Russian Academy of Science, Moscow 117975, Russia
[2]Earth Science and Solar System Exploration Division, SN2, NASA Johnson Space Center, Houston, Texas 77058, U.S.A.
[3]Institute of Materials Structure Science, Tsukuba-shi, Ibaraki-ken, 305, Japan
[4]Lockheed Engineering and Science Co., Houston, Texas 77258, U.S.A.
[5]Mineralogical Institute, Faculty of Science, University of Tokyo, Hongo, Bunkyo-Ku, Tokyo 113, Japan

ABSTRACT

Florenskyite is a new phosphide species from the Kaidun chondritic meteorite, which fell in South Yemen in 1980. Kaidun is a unique chondritic breccia containing a huge variety of fragments of different chondritic types. Florenskyite was found as four dispersed grains with a maximum dimension of 14 μm within a single mass of Fe-rich serpentine within one Kaidun clast. Florenskyite is associated with submicrometer-sized grains of pentlandite and small (up to 1.5 μm in width) laths of a still uncharacterized Fe-Cr phosphide. Florenskyite is creamy white in reflected light, and its luster is metallic. The average of three electron microprobe analyses gave (wt%) Fe 40.52, Ti 30.08, Ni 5.47, Cr 0.93, V 0.91, Co 0.60, P 21.69, Si 0.59, sum 100.79, corresponding to $Fe_{1.01}(Ti_{0.87}Ni_{0.13}Cr_{0.03}V_{0.02}Co_{0.01})_{1.06}(P_{0.97}Si_{0.03})$. Single-crystal structure analysis was performed on florenskyite using a Laue pattern collected from a multiple crystal by in-situ synchrotron X-ray diffraction. Florenskyite crystallizes in the space group *Pnma*, and has the anti-$PbCl_2$ structure. Previously determined cell constants of synthetic material [a = 6.007(1), b = 3.602(1), c = 6.897(1) Å] were used in the single-crystal data reduction. We used the POWD12 program to calculate a powder XRD pattern; the 5 most intense reflections are d = 2.301 (I = 100), 2.188 (88), 2.307 (47), 1.938 (45), and 1.801 Å (45). Florenskyite is only the fourth phosphide to be described from nature. Its paragenesis may be unique, and may be due to melting of a mineral assemblage including Fe-Ni metal, schreibersite, daubreelite, osbornite, or heideite and subsequent crystallization of phosphides from the melt.