American Mineralogist, Volume 87, pages 160–170, 2001

Ominelite, $(Fe,Mg)Al_3BSiO_9$ (Fe^{2+} analogue of grandidierite), a new mineral from porphyritic granite in Japan

YOSHIKUNI HIROI,[1,*] EDWARD S. GREW,[2] YOICHI MOTOYOSHI,[3] DONALD R. PEACOR,[4] ROLAND C. ROUSE,[4] SATOSHI MATSUBARA,[5] KAZUMI YOKOYAMA,[5] RITSURO MIYAWAKI,[5] JAMES J. MCGEE,[6] SHU-CHUN SU,[7] TOMOKAZU HOKADA,[3] NOBORU FURUKAWA,[1] AND HIROSHI SHIBASAKI[8]

[1]Department of Earth Sciences, Chiba University, Yayoicho, Inage-ku, Chiba 263-8522, Japan
[2]Department of Geological Sciences, University of Maine, Orono, Maine 04469, U.S.A.
[3]Department of Crustal Studies, National Institute of Polar Research, Kaga, Itabashi-ku, Tokyo 173-8515, Japan
[4]Department of Geological Sciences, University of Michigan, Ann Arbor, Michigan 48109, U.S.A.
[5]Department of Geology, National Science Museum, Hyakunincho, Shinjuku-ku, Tokyo 169-0073, Japan
[6]Department of Geological Sciences, University of South Carolina, Columbia, South Carolina 29208, U.S.A.
[7]Hercules Research Center, 500 Hercules Road, Wilmington, Delaware 19808, U.S.A.
[8]Overseas Activities Department, Metal Mining Agency of Japan, Toranomon, Minato-ku, Tokyo 105-0001, Japan

ABSTRACT

Ominelite, $(Fe,Mg)Al_3BSiO_9$, is the Fe^{2+} analog of grandidierite. The mineral occurs as elongated and euhedral to equant and anhedral grains in close association with sekaninaite (Fe-dominant analogue of cordierite), garnet, biotite, andalusite, topaz, alkali feldspar, plagioclase, muscovite, quartz, dumortierite, schorl, zircon, ilmenite, apatite, monazite, and pyrite in a porphyritic granite of Miocene age exposed along the Misen River in Tenkawa, Yoshino, Nara Prefecture, Japan (34°12'40"N, 135°53'40"E). Temperatures <700 °C and pressures below 4 kbars are suggested for the formation of ominelite and associated sekaninaite, topaz, andalusite and dumortierite. The Al-rich minerals could be either magmatic or restitic in origin. A representative electron microprobe analysis of ominelite is SiO_2 19.34, TiO_2 <0.01, Al_2O_3 48.85, FeO 19.37, MnO 0.43, MgO 1.33, CaO <0.01, P_2O_5 0.13, B_2O_3 10.91 wt%, total 100.36 wt%, corresponding to $Fe_{0.85}Mg_{0.10}Mn_{0.02}Al_{3.01}B_{0.99}P_{0.01}Si_{1.01}O_9$. Mohs' hardness is about 7. No cleavage is observed. Its color is blue, and the streak is pale blue. It is pleochroic $X = Z$ = pale blue-green and Y = colorless. Optically, it is biaxial (–) and, at λ = 589 nm, has α = 1.631 (1), β = 1.654 (1), γ = 1.656 (1), $2V_X$ (meas.) = 31.5 (6)°. Y = **c** (prism elongation direction). Dispersion is v >> r. Major lines in the powder pattern [d in Å, (I), (hkl)] are 5.57(m)(020), 5.21(vs)(200), 3.73(m)(121), 3.51(m)(130), 2.97(s)(101), 2.79(s)(040), 2.18(s)(150, 421, 312). Space group is *Pbnm*. Lattice parameters are a = 10.343 (2), b = 11.095 (1), c = 5.7601 (8) Å and V = 661.0(2) Å^3, Z = 4, D_{calc} = 3.169 g/cm^3. Refinement of the structure confirms that ominelite is isostructural with grandidierite with no detectable substitution of Al by Fe^{3+}.