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Mengxianminite, $Ca_2Sn_2Mg_3Al_8[(BO_3)(BeO_4)O_6]_2$, a new borate mineral from Xianghualing skarn, Hunan Province, China

Mengxianminite, $Ca_2Sn_2Mg_3Al_8[(BO_3)(BeO_4)O_6]_2$, is a new borate mineral from Xianghualing skarn, Hunan Province, southern China. It occurs in the Hsianghualite vein from this skarn, and is associated with fluorite, phlogopite, hsianghualite, magnetite, tourmaline, magnesiotaaffeite-2*N*2*S* and calcite. Mengxianminite forms subhedral to euhedral green crystals from 20 to 200 μm long, translucent to transparent, with a vitreous luster. The crystals show perfect cleavage on {100} and good cleavage on {010}, and do not fluoresce in long- or short-wave ultraviolet light. The estimated Mohs hardness is 8, and the tenacity is brittle with irregular fracture. The calculated density is 4.17 g/cm^3. Optically, mengxianminite is biaxial (–), with α = 1.80(2), β = 1.83(2), γ = 1.84(2) (589 nm). Chemical analysis by electron microprobe (average of 6) gave Al_2O_3 40.00, SnO_2 25.96, MgO 6.57, CaO 8.56, FeO 4.83, B_2O_3 6.52, BeO 4.68, ZnO 1.81, MnO 1.23, Na_2O 1.13, TiO_2 0.10, SiO_2 0.04, sum 101.42 wt%. The empirical formula, calculated on the basis of 26O, 2Be and 2B atoms per formula unit, is: $(Ca_{1.63},Na_{0.39})_{\Sigma 2.02}(Sn_{1.84},Zn_{0.24})_{\Sigma 2.08}(Mg_{1.74},Fe_{0.72},Al_{0.38},Mn_{0.19},Ti_{0.01})_{\Sigma 3.04}Al_8[(BO_3)(BeO_4)O_6]_2$. The stronger eight lines of the powder XRD pattern [d in Å (I)(hkl)] are: 3.000(35)(16 20); 2.931(100)(17 11); 2.475(29)(022); 2.430(30)(13 31); 2.375(100)(14 02/640); 2.028(52)(21 31); 1.807(35)(913); 1.530(98)(14 60/15 33). Mengxianminite is orthorhombic, space group *Fdd*2; unit-cell parameters refined from single-crystal X-ray diffraction data are: *a* = 60.689 (3), *b* = 9.907 (1), *c* = 5.740 (1) Å, *V* = 3451.0 (3) Å3, Z = 8. The structure of mengxianminite is composed of alternating O-T1-O-T2-O'-T2 layers stacked along the a axis, equal to two alternating modules: A module (O-T1-O) consists of the spinel modular and another O layer (AlO_6 octahedra layer); B modular (T2-O'-T2) shows the simplified formula $CaSnAl(BeO_4)(BO_3)$, SnO_6 octahedra are isolated in the T2 layers, connected via BeO_4 and CaO_{11} groups; AlO_6 edge-sharing octahedra in the O' layer form chains running along the *b* axis; these chains are connected in the c direction by the BO_3 triangular groups. Mengxianminite is of hydrothermal origin, crystallized during the late stage of the xianghualing skarn.

Biography

Can Rao has completed his PhD and Post-doctoral studies from Nanjing University, China.. He is an Associate Professor at Zhejiang University, China. He has found 3 new minerals (strontiohurlbutite, minjiangite and mengxianminite), which have been approved by IMA, and published 16 papers in reputed journals.

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