Mengxianminite, $\text{Ca}_2\text{Sn}_2\text{Mg}_3\text{Al}_8[(\text{BO}_3)(\text{BeO}_4)\text{O}_6]_2$, a new borate mineral from Xianghualing skarn, Hunan Province, China

Mengxianminite, $\text{Ca}_2\text{Sn}_2\text{Mg}_3\text{Al}_8[(\text{BO}_3)(\text{BeO}_4)\text{O}_6]_2$, 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-2N2S 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 $\alpha = 1.80(2)$, $\beta = 1.83(2)$, $\gamma = 1.84(2)$ (589 nm). Chemical analysis by electron microprobe (average of 6) gave $\text{Al}_2\text{O}_3=40.00$, $\text{SnO}_2=25.96$, $\text{MgO}=6.57$, $\text{CaO}=8.56$, $\text{FeO}=4.83$, $\text{B}_2\text{O}_3=6.52$, $\text{BeO}=4.68$, $\text{ZnO}=1.81$, $\text{MnO}=1.23$, $\text{Na}_2\text{O}=0.13$, $\text{SiO}_2=0.04$, sum 101.42 wt%. The estimated formula, calculated on the basis of 26O, 2Be and 2B atoms per formula unit, is: $(\text{Ca}_{1.63}\text{Na}_{0.39})_{2.02}(\text{Sn}_{1.84}\text{Zn}_{0.24})_{2.08}(\text{Mg}_{1.74}\text{Fe}_{0.72}\text{Al}_{0.38}\text{Mn}_{0.19}\text{Ti}_{0.01})_{3.04}\text{Al}_8[(\text{BO}_3)(\text{BeO}_4)\text{O}_6]_2$. 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 $Fdd2$; 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, $V = 3451.0 (3)$ Å$^3$, $Z = 8$. 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(BO$_3$)(BO$_2$). SnO$_2$ octahedra are isolated in the T2 layers, connected via BeO$_4$ and CaO$_4$ groups; AlO$_2$ 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.

canrao@zju.edu.cn

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