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Ferrotitanowodginite, $Fe^{2+}TiTa_2O_8$, a new mineral of the wodginite group from the San Elías pegmatite, San Luis, Argentina

MIGUEL ANGEL GALLISKI,[1] PETR ČERNÝ,[2,*] MARÍA FLORENCIA MÁRQUEZ-ZAVALÍA,[1] AND RON CHAPMAN[2]

[1]Instituto Argentino de Nirología, Glaciología y Ciencias Ambientales—Consejo Nacional de Investigaziones Ceintíficas e Téchnicas, Av. Adrian Ruiz Leal s/n Parque General San Martín, (5500) Mendoza, República Argentina
[2]Department of Geological Sciences, University of Manitoba, Winnipeg, Manitoba R3T 2N2, Canada

ABSTRACT

Ferrotitanowodginite is a new mineral of the wodginite group, which is found in and defined from two closely adjacent pegmatites in the San Luis province, Argentina, but previously encountered in the Tanco (Manitoba) and Marko's (Ontario) pegmatites. In the San Elías pegmatite, ferrotitanowodginite occurs aggregated with ferrowodginite and associated with microlite, ferrotapiolite, cleavelandite, and quartz. In La Viquita pegmatite, ferrotitanowodginite occurs in a replacement unit associated with wodginite, ferrowodginite, titanowodginite and ferrotapiolite in yellow muscovite and quartz. Ferrotitanowodginite is very dark brown to black, with a dark brown streak and submetallic luster. Mohs hardness is $5^1/_2$ and D_{calc} = 7.368 g/cm^3. In reflected light, it is creamy white and gray in air and oil, respectively; anisotropy is distinct, bireflectance and pleochroism moderate. Ferrotitanowodginite is monoclinic, space group *C2/c*, Z = 4. Unit-cell dimensions for San Elías' material are *a* = 9.403(4) Å, *b* = 11.384(3) Å, *c* = 5.075(1) Å, β = 90.55° (2), *V* = 543.24(22) Å^3. The strongest lines in the X-ray powder diffraction are *d* = 2.963 Å, *I* = 100%, (*hkl* = 22$\bar{1}$); *d* = 2.939 Å, *I* = 90% (*hkl* = 221); *d* = 3.626 Å, *I* = 70% (*hkl* = 220); and *d* = 1.715 Å, *I* = 50% (*hkl* = 402). Eighteen analyses by electron microprobe gave the following mean composition: WO_3 0.02, Nb_2O_5 6.52, Ta_2O_5 70.68, TiO_2 7.10, SnO_2 1.25, ThO_2 0.01, UO_2 0.02, As_2O_3 0.03, Sb_2O_3 0.02, Bi_2O_3 0.03, Fe_2O_3 2.18, MgO 0.01, CaO 0.01, MnO 1.05, FeO 10.27, PbO 0.05, total 99.25 wt%. The La Viquita sample is much richer in Mn and Sn. The simplified formula for ferrotitanowodginite is: $(Fe^{2+},Mn^{2+})(Ti,Sn^{4+},Ta,Fe^{3+})(Ta,Nb)_2O_8$, ideally $Fe^{2+}TiTa_2O_8$.