## Ferrotitanowodginite $Fe^{2+}TiTa_2O_8$

**Crystal Data**: Monoclinic. *Point Group*: 2/*m*. As submillimeter domains intergrown with Ti-rich ferrowodginite in aggregates, to 0.7 cm, with diamond-shaped cross-sections. *Twinning*: By penetration with (001) or (100) as composition planes of individuals defined mainly by {111} faces.

**Physical Properties**: *Cleavage*: None. *Fracture*: Irregular. *Tenacity*: Brittle. Hardness = 5.5 D(meas.) = n.d. D(calc.) = 7.368

**Optical Properties**: Translucent. *Color*: Very dark brown to black; creamy white in reflected light with abundant yellow, orange, and purplish orange internal reflections in air, and green, yellow, orange, and purplish brown in oil. *Streak*: Dark brown. *Luster*: Submetallic.
*Optical Class*: n.d.
*Anisotropism*: Distinct, light greenish-gray to gray in air; light greenish gray to olive-greenish gray in oil. *Bireflectance*: Moderate. *Pleochroism*: Moderate, creamy white to creamy gray in air; light greenish gray to gray in oil.
$R_1$-$R_2$: (400) 22.2-22.2, (440) 19.5-18.6, (460) 19.1-18.1, (470) 18.7-18.2, (480) 18.4-17.5, (500) 18.6-17.2, (520) 18.4-17.0, (540) 18.8-17.7, (546) 19.1-18.1, (560) 18.5-17.0, (580) 17.9-16.6, (589) 17.9-16.9, (600) 18.1-16.8, (620) 16.4-14.6, (650) 16.4-15.6, (680) 15.9-15.2, (700) 12.9-11.5

**Cell Data**: *Space Group*: *C*2/*c*. $a = 9.403(4)$ $b = 11.384(3)$ $c = 5.075(1)$ $\beta = 90.55°$ Z = 4

**X-ray Powder Pattern**: San Elías pegmatite, San Luis province, Argentina.
2.963 (100), 2.939 (90), 3.626 (70), 1.715 (50), 2.484 (45), 1.759 (45), 1.711 (45)

**Chemistry**:

| | (1) | (2) | | (1) | (2) |
|---|---|---|---|---|---|
| $WO_3$ | 0.02 | | $Sb_2O_3$ | 0.02 | |
| $Nb_2O_5$ | 6.52 | 7.18 | $Bi_2O_3$ | 0.03 | 0.04 |
| $Ta_2O_5$ | 70.68 | 64.11 | $Fe_2O_3$ | 2.18 | 0.62 |
| $TiO_2$ | 7.10 | 7.15 | MgO | 0.01 | 0.08 |
| $SnO_2$ | 1.25 | 7.66 | CaO | 0.01 | 0.03 |
| $ThO_2$ | 0.01 | | MnO | 1.05 | 4.58 |
| $UO_2$ | 0.02 | | FeO | 10.27 | 6.82 |
| $As_2O_3$ | 0.03 | 0.02 | PbO | 0.05 | . |
| | | | Total | 99.25 | 98.29 |

(1) San Elías pegmatite, San Luis province, Argentina; average electron microprobe analysis; corresponds to $(Fe^{2+}_{0.869}Mn^{2+}_{0.088}\square_{0.039}Mg_{0.001}Ca_{0.001}Sb^{3+}_{0.001}Pb^{2+}_{0.001})_{\Sigma=1.000}(Ti^{4+}_{0.540}Ta_{0.244}Fe^{3+}_{0.166}Sn^{4+}_{0.050})_{\Sigma=1.000}(Ta_{1.702}Nb_{0.297})_{\Sigma=1.999}O_8$. (2) La Viquita pegmatite; corresponds to $(Fe^{2+}_{0.574}Mn^{2+}_{0.390}\square_{0.017}Mg_{0.013}Ca_{0.003}Bi_{0.002}Zn_{0.001}Sb_{0.001})_{\Sigma=1.000}(Ti^{4+}_{0.541}Sn^{4+}_{0.307}Ta_{0.082}Fe^{3+}_{0.047}Zr^{5+}_{0.021}As_{0.001})_{\Sigma=0.999}(Ta_{1.672}Nb_{0.327})_{\Sigma=1.999}O_8$.

**Mineral Group**: Wodginite group.

**Occurrence**: In complex rare-element pegmatite in locally tourmalinized quartz-mica schist of medium metamorphic grade.

**Association**: Ferrowodginite, ferrotapiolite, cleavelandite, quartz (San Elías); wodginite, ferrowodginite, titanowodginite, ferrotapiolite, muscovite, quartz (La Viquita).

**Distribution**: From the San Elías and La Viquita pegmatites, Sierra de la Estanzuela, Chacabuco, San Luis province, Argentina.

**Name**: Prefixes, *ferro* indicates $Fe^{2+}$-dominant in the A site and *titano* indicates Ti-dominant in the B site in a member of the *wodginite* group.

**Type Material**: Mineralogical Museum Prof. Manuel Tellechea, Mendoza, Argentina (8554).

**References**: (1) Galliski, M.A., P. Černý, M.F. Márquez-Zavalía, and R. Chapman (1999) Ferrotitanowodginite, $Fe^{2+}TiTa_2O_8$, a new mineral of the wodginite group from the San Elías pegmatite, San Luis, Argentina. Amer. Mineral., 84, 773-777.