Isolueshite $(Na, La, Ca)(Nb, Ti)O_3$

Crystal Data: Tetragonal. *Point Group:* $4/m\ 2/m\ 2/m$. In subhedral to anhedral grains, to 0.1 mm, in monomineralic aggregates, to cm size.

Physical Properties: Hardness = 6–6.5 VHN = 681–772 (100 g load). D(meas.) = 4.85 D(calc.) = 4.89 Strongly magnetic.

Optical Properties: Opaque. *Color:* Greenish black; light olive-gray in reflected light. *Streak:* Black. *Luster:* Metallic.
Optical Class: Uniaxial. *Anisotropism:* Moderate; yellowish to brownish gray.
R_1–R_2: (420) 20.0–19.4, (440) 19.9–19.3, (460) 20.3–19.5, (480) 20.4–19.6, (500) 20.8–19.8, (520) 21.2–20.1, (540) 21.4–20.3, (560) 21.3–20.4, (580) 21.2–20.1, (600) 21.0–20.0, (620) 20.9–19.7, (640) 20.5–19.6, (660) 20.4–19.2, (680) 20.2–19.1

Cell Data: *Space Group:* $I4_1/amd$. $a = 6.025(1)$ $c = 8.539(1)$ $Z = 4$

X-ray Powder Pattern: Gozaisho mine, Japan.
2.570 (100), 3.016 (40), 1.506 (40), 1.509 (35), 4.929 (30), 1.640 (30), 2.135 (16)

Chemistry:

	(1)
SiO_2	0.47
TiO_2	0.30
Al_2O_3	0.32
Fe_2O_3	44.42
Mn_2O_3	22.70
MnO	30.34
MgO	0.61
SrO	0.04
Na_2O	0.02
K_2O	0.02
Total	99.24

(1) Gozaisho mine, Japan; corresponds to $(Mn^{2+}_{0.98}Mg_{0.04})_{\Sigma=1.02}(Fe^{3+}_{1.28}Mn^{3+}_{0.66}Si_{0.02}Al_{0.01}Ti_{0.01})_{\Sigma=1.98}O_4$.

Polymorphism & Series: Dimorphous with jacobsite.

Occurrence: In a regionally metamorphosed bedded manganese deposit.

Association: Rhodonite, braunite, rhodochrosite, hematite, spessartine, quartz.

Distribution: From the Gozaisho mine, Iwaki, Fukushima Prefecture, Japan.

Name: For its occurrence near Iwaki, Japan.

Type Material: National Science Museum, Tokyo, Japan, M21865; National Museum of Natural History, Washington, D.C., USA, 132923.

References: (1) Matsubara, S., A. Kato, and K. Nagashima (1979) Iwakiite, $Mn^{+2}(Fe^{+3}, Mn^{+3})_2O_4$, a new tetragonal spinelloid mineral from the Gozaisho mine, Fukushima Prefecture, Japan. Mineral. J. (Japan), 9, 383–391. (2) (1980) Amer. Mineral., 65, 406 (abs. ref. 1). (3) Jarosch, D. (1988) Crystal structure of iwakiite. Zeits. Krist., 185, 605.