Okhotskite $\mathbf{Ca_2(Mn^{2+},Mg)(Mn^{3+},Al,Fe^{3+})_2Si_3O_{10}(OH)_4}$

Crystal Data: [Monoclinic] (by analogy to the pumpellyite group). *Point Group:* [$2/m$.] As long prismatic crystals, to 0.2 mm, and as aggregates of prisms.

Physical Properties: *Cleavage:* One set observed in thin section. Hardness = 6
D(meas.) = n.d. D(calc.) = 3.40

Optical Properties: Transparent. *Color:* Deep orange. *Streak:* Pale orange.
Luster: Vitreous.
Optical Class: Biaxial (–). *Pleochroism:* Strong; X = yellow; $Y = Z$ = deep orange.
Orientation: $Y = b$; $Z \wedge c = 9°$–$14°$. *Absorption:* $Z > Y > X$. $\alpha = 1.782(5)$ $\beta = 1.820(5)$ $\gamma = 1.827(5)$ 2V(meas.) = 46(5)° 2V(calc.) = 46°

Cell Data: *Space Group:* [$A2/m$.] $a = 8.887(5)$ $b = 6.000(4)$ $c = 19.53(2)$ $\beta = 97.08(6)°$ Z = 4

X-ray Powder Pattern: Kokuriki mine, Japan.
2.961 (100), 3.87 (70), 2.720 (70), 4.76 (60), 2.665 (45), 2.553 (45), 2.384 (45)

Chemistry:

	(1)
SiO_2	34.25
TiO_2	0.09
Al_2O_3	4.49
Fe_2O_3	6.03
Mn_2O_3	16.69
MnO	9.18
MgO	2.08
CaO	20.11
Na_2O	0.25
K_2O	0.03
H_2O	6.89
Total	100.09

(1) Kokuriki mine, Japan; by electron microprobe, H_2O by TGA, Fe^{3+} confirmed by Mössbauer spectroscopy, Mn^{2+}:Mn^{3+} calculated from stoichiometry; corresponds to $(Ca_{1.91}Na_{0.04})_{\Sigma=1.95}(Mn^{2+}_{0.69}Mg_{0.28})_{\Sigma=0.97}(Mn^{3+}_{1.13}Al_{0.47}Fe^{3+}_{0.40})_{\Sigma=2.00}Si_{3.03}[O_{9.93}(OH)_{4.07}]_{\Sigma=14.00}$.

Mineral Group: Pumpellyite group.

Occurrence: In network veinlets cutting hematite-rich ores.

Association: Hematite, quartz, piemontite, neotocite, bementite, apatite, inesite, rhodochrosite.

Distribution: From the Kokuriki mine, at Hiyoshi, about 20 km north of Kitami City, Hokkaido, Japan.

Name: For the Sea of Okhotsk, near the type locality in Japan.

Type Material: n.d.

References: (1) Togari, K. and M. Akasaka (1987) Okhotskite, a new mineral, an Mn^{3+}-dominant member of the pumpellyite group, from the Kokuriki mine, Hokkaido, Japan. Mineral. Mag., 51, 611–614. (2) (1988) Amer. Mineral., 73, 1495–1496 (abs. ref. 1).