Nambulite $(Li,Na)Mn_4^{2+}Si_5O_{14}(OH)$

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. As prismatic to tabular crystals, to 8 mm; massive in veinlets.

Physical Properties: *Cleavage:* Perfect on {001}, distinct on {010} and {100}.
Hardness = 6.5 D(meas.) = 3.53(1) D(calc.) = 3.55

Optical Properties: Transparent. *Color:* Reddish brown with an orange tint. *Streak:* Pale yellow. *Luster:* Vitreous.
Optical Class: Biaxial (+). *Pleochroism:* Slight. *Orientation:* $X' \wedge c = 19°$ on {010}.
Dispersion: $r > v$, weak. $\alpha = 1.707(2)$ $\beta = 1.710(2)$ $\gamma = 1.730(2)$ 2V(meas.) = 30(2)°

Cell Data: *Space Group:* $P\bar{1}$. $a = 7.621(5)$ $b = 11.761(8)$ $c = 6.731(5)$ $\alpha = 92°46(3)'$ $\beta = 95°5(3)'$ $\gamma = 106°52(5)'$ Z = 2

X-ray Powder Pattern: Funakozawa mine, Japan.
2.96 (100), 2.97 (80), 2.92 (70), 3.17 (65), 3.07 (60), 3.09 (55), 3.14 (45)

Chemistry:

	(1)		(1)
SiO_2	49.23	Na_2O	2.49
TiO_2	0.01	K_2O	0.04
Al_2O_3	0.37	Cl	0.00
Fe_2O_3	0.40	H_2O^+	1.63
MnO	40.67	H_2O^-	0.26
MgO	1.32	CO_2	0.19
CaO	0.81	P_2O_5	0.02
Li_2O	1.55	SO_3	0.00
		Total	98.99

(1) Funakozawa mine, Japan; corresponding to $(Li_{0.50}Na_{0.49}K_{0.01})_{\Sigma=1.00}(Mn_{3.48}Mg_{0.20}Li_{0.14}Ca_{0.09}Al_{0.04}Fe_{0.03})_{\Sigma=3.98}Si_5O_{13.90}(OH)_{1.10}$.

Polymorphism & Series: Forms a series with natronambulite.

Occurrence: In veinlets cutting braunite ores in chert (Funakozawa mine, Japan).

Association: Braunite, albite, neotocite, rhodochrosite (Funakozawa mine, Japan).

Distribution: In the Funakozawa and Ohtaniyama mines, Ohno, Iwate Prefecture, and the Gozaisho mine, Iwaki, Fukushima Prefecture, Japan.

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Type Material: National Science Museum, Tokyo, Japan, M18829.

References: (1) Yoshii, M., Y. Aoki, and K. Maeda (1972) Nambulite, a new lithium- and sodium-bearing manganese silicate from the Funakozawa mine, northeastern Japan. Mineral. J. (Japan), 7, 29–44. (2) (1973) Amer. Mineral., 58, 1112 (abs. ref. 1). (3) Narita, H., K. Koto, and N. Morimoto (1975) The crystal structure of nambulite $(Li,Na)Mn_4Si_5O_{14}(OH)$. Acta Cryst., 31, 2422–2426.