Beusite-(Ca) $CaMn^{2+}_2(PO_4)_2$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As lamellae (to 1.5 mm wide) in optical orientation with each other, epitaxially intergrown with triphylite.

Physical Properties: *Cleavage*: Good on {010} and {100}. *Fracture*: Irregular. *Tenacity*: Brittle. Hardness = ~5 D(meas.) = n.d. D(calc.) = 3.610

Optical Properties: Transparent. *Color*: Pale brown, colorless in transmitted light. *Streak*: Very pale brown. *Luster*: Vitreous. *Optical Class*: Biaxial (+). α = 1.685(2) β = 1.688(2) γ = 1.700(5) 2V(meas.) = 46.0(5)° 2V(calc.) = 53° *Orientation*: $X \parallel b$, $Y \wedge a$ = 40.3° in β obtuse, $Z \wedge a$ = 49.7° in β acute. *Dispersion*: $r < v$, weak. *Pleochroism*: None.

Cell Data: Space Group: $P2_1/c$. a = 8.7990(18) b = 11.724(2) c = 6.1700(12) β = 99.23(3)° Z = 4

X-ray Powder Pattern: Calculated pattern.
2.904, (100), 3.564 (97), 2.932 (87), 2.873 (86), 2.718 (86), 2.991 (76), 3.030 (58)

Chemistry:

	(1)	(2)
P_2O_5	41.63	41.76
FeO	19.43	
MnO	23.63	41.74
MgO	nd	
CaO	15.45	16.50
Total	100.14	100.00

(1) Yellowknife pegmatite field, Northwest Territories, Canada; average of 10 electron microprobe analyses supplemented by Raman and Mössbauer spectroscopy; corresponds to $Ca_{0.94}(Mn_{1.13}Fe_{0.92})_{\Sigma=2.05}(PO_4)_{2.00}$. (2) $CaMn_2(PO_4)_2$.

Polymorphism & Series: Forms series with beusite and graftonite members of the group.

Mineral Group: Graftonite group.

Occurrence: A common primary phosphate in a beusite-triphylite nodule (6×5×3 cm) in beryl-columbite-phosphate subtype of zoned rare-element pegmatites, in a small dike, which cuts an interlayered sequence of amphibolite and granodiorite. The product of exsolution from a (Li,Ca)-rich graftonite-like parent phase crystallized at high temperature from P-bearing hydrosaline melts related to anatectic melts, generated by partial melting of metasedimentary-metavolcanics rocks.

Association: Triphylite-lithiophilite, sarcopside.

Distribution: In the Yellowknife pegmatite field, between Upper Ross Lake and Redout Lake, 75 km northeast of Yellowknife and 3.5 km east of the Redout granite, Northwest Territories, Canada.

Name: The suffix indicates the *Ca*-analogue of *beusite*.

Type Material: Department of Mineral Sciences, National Museum of Natural History, Washington, D.C., USA (177054).

References: (1) Hawthorne, F.C., M.A. Wise, P. Černý, Y. Abdu, N.A. Ball, A. Pieczka, and A. Włodek (2018) Beusite-(Ca), ideally $CaMn^{2+}_2(PO_4)_2$, a new graftonite-group mineral from the Yellowknife pegmatite field, Northwest Territories, Canada: Description and crystal structure. Mineral. Mag., 82(6), 1323-1332. (2) (2020) Amer. Mineral., 105(7), 972-973 (abs. ref. 1). (3) Hawthorne, F.C. and A. Pieczka (2018) Classification of the minerals of the graftonite group. Mineral. Mag., 82(6), 1301-1306.