

Crystal Data: Monoclinic. *Point Group:* 2/m. As crystals tabular on {010} to 0.5 mm.

Physical Properties: *Cleavage:* None. *Tenacity:* Brittle. *Fracture:* Conchoidal.
Hardness = n.d. D(meas.) = 3.61(4) D(calc.) = 3.88

Optical Properties: Transparent. *Color:* Brown. *Streak:* White. *Luster:* Vitreous.
Optical Class: Biaxial (-). $\alpha = 1.680(5)$ $\beta = 1.694(2)$ $\gamma = 1.708(5)$ 2V(meas.) = $\sim 90^\circ$

Cell Data: *Space Group:* P2/a. $a = 19.032(9)$ $b = 4.746(3)$ $c = 10.248(5)$ $\beta = 110.97(5)^\circ$ $Z = 2$

X-ray Powder Pattern: Calculated pattern.

2.854 (100), 2.916 (86), 2.646 (86), 3.085 (85), 2.647 (84), 2.635 (84), 3.243 (80)

Chemistry:	(1)	(1)	(1)		
SiO ₂	23.85	CaO	24.46	Dy ₂ O ₃	0.024
B ₂ O ₃	13.85	BaO	0.002	Er ₂ O ₃	0.020
BeO	2.94	La ₂ O ₃	7.42	Gd ₂ O ₃	0.094
Li ₂ O	0.037	Ce ₂ O ₃	12.63	Dy ₂ O ₃	0.024
TiO ₂	0.560	Y ₂ O ₃	0.073	Yb ₂ O ₃	0.002
Al ₂ O ₃	2.53	Pr ₂ O ₃	1.103	ThO ₂	4.01
Fe ₂ O ₃	3.06	Nd ₂ O ₃	2.36	UO ₂	0.430
Cr ₂ O ₃	0.00	Sm ₂ O ₃	0.137	H ₂ O	0.390
Mn ₂ O ₃	0.00	Eu ₂ O ₃	0.005	F	1.00
MgO	0.140	Gd ₂ O ₃	0.094	- O = F	0.421
				Total	100.71

(1) Tre Croci, near Vetralla, Viterbo province, Latium, Italy; electron microprobe analysis; B, Be, Li, OH and F by SIMS; corresponds to $\text{Ca}_4[\text{REE}^{3+}_{1.45}\text{Ca}_{0.37}(\text{Th},\text{U})^{4+}_{0.17}\text{Y}_{0.01}]_{\Sigma=2}(\text{Al}_{0.50}\text{Fe}^{3+}_{0.38}\text{Ti}^{4+}_{0.17}\text{Mg}_{0.03})_{\Sigma=0.98}(\text{Be}_{1.18}\square_{0.37}\text{Li}_{0.02})\text{B}_{3.99}\text{Si}_{3.98}\text{O}_{22}\text{O}_5[\text{O}^{2-}_{1.04}\text{F}_{0.53}(\text{OH})_{0.43}]_{\Sigma=2}$ or $^{\text{X}}\text{Ca}_4^{\text{Y}}[\text{REE}^{3+}_{1.46}\text{Th}^{4+}_{0.66}\text{Ca}_{0.37}]_{\Sigma=2}^{\text{Z}}\text{Al}_{0.98}^{\text{T}}(\text{Be}_{1.18}\square_{0.37}\text{Li}_{0.02})_{\Sigma=1.57}[\text{B}_4\text{Si}_4\text{O}_{22}]^{\text{H}}[\text{O}_{1.57}(\text{OH})_{0.43}]_{\Sigma=2}$.

Mineral Group: Hellandite group.

Occurrence: In miarolitic cavities and voids in feldspathoid-bearing alkali-syenitic pyroclastic ejecta. Formed by late-stage post-magmatic hydrothermal fluids enriched in Zr, Ti, REEs, and actinide elements.

Association: Britholite-(Ce), sanidine, plagioclase (An 20-80%), nepheline, biotite, clinopyroxene, titanite, andradite, magnetite, zircon, titanite, baddeleyite, a phase with composition near cheralite-brabantite.

Distribution: From the “lower pyroclastic flow” of the Sabatini volcanic complex, at Monte Cavalluccio, Sacrofano, north of Rome, Italy.

Name: Honors Annibale *Mottana*, Professor of Mineralogy, University of Roma Tre (Italy), for his leadership and support of investigations and cataloguing of Latium minerals, during which the mottanaite-(Ce) sample was found; the suffix indicates the dominant REE.

Type Material: Mineralogy Museum, the University of Rome, Italy (30023/1).

References: (1) Della Ventura, G., P. Bonazzi, R. Oberti, and L. Ottolini (2002) Ciprianiite and mottanaite-(Ce), two new minerals of the hellandite group from Latium (Italy). *Amer. Mineral.*, 87, 739-744. (2) Oberti, R., A. Langone, M. Boiocchi, E. Bernabè, and F.C. Hawthorne (2019) News from the hellandite group: the redefinition of mottanaite and ciprianiite and the new mineral description of ferri-mottanaite-(Ce), the first Fe³⁺-dominant hellandite. *Eur. J. Mineral.*, 31, 799-806.