

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. As irregular inclusions in diamond, to 150 μm .

Physical Properties: *Cleavage:* None observed. *Tenacity:* n.d. *Fracture:* n.d. *Hardness* = n.d. *D(meas.)* = n.d. *D(calc.)* = 3.072 Non-fluorescent.

Optical Properties: Transparent. *Color:* Colorless. *Streak:* n.d. *Luster:* Vitreous.
Optical Class: n.d.

Cell Data: *Space Group:* $P\bar{1}$. $a = 6.6970(4)$ $b = 9.2986(7)$ $c = 6.6501(4)$ $\alpha = 83.458(6)^\circ$
 $\beta = 76.226(6)^\circ$ $\gamma = 69.581(7)^\circ$ $Z = \text{n.d.}$

X-ray Powder Pattern: Calculated pattern.

2.90 (100), 3.03 (58), 3.15 (40), 5.01 (32), 2.63 (24), 1.79 (18), 3.87 (15)

Chemistry:	(1)	(2)
	CaO 48.04	48.28
	<u>SiO₂ 51.96</u>	<u>51.72</u>
	Total 100.00	100.00

(1) Sao Luiz diamond placers, Juina area, Mato Grosso State, Brazil; average semiquantitative EDS analysis, normalized to 100%; corresponds to Ca_{3.01}Si_{2.98}O₉. (2) Ca₃Si₃O₉.

Polymorphism & Series: Polymorph of wollastonite.

Mineral Group: Margarosanite group.

Occurrence: The second most abundant mineral inclusion after ferropericlase in diamonds of super-deep origin; only found in super-deep diamonds. Breyite is presumed to be a strong indicator of lower mantle (>670 km depth) or at least lower transition zone (>520 km depth) origin of both the host diamond and the inclusion suite.

Association: Diamond, ferropericlase, CaTiO₃ perovskite, β -Ca₂SiO₄ larnite, titanite-structured CaSi₂O₅, ringwoodite.

Distribution: Studied material from Sao Luiz diamond placers, Juina area, Mato Grosso State, Brazil.

Name: Previously known as CaSiO₃-walstromite. Honors the German mineralogist, petrologist, and geochemist Gerhard P. Brey (b. 1947), Professor of Mineralogy, Institute of Geosciences, Goethe University Frankfurt, Germany (1994- 2014). Brey was a pioneer in experimental petrology at high-pressures and developed a comprehensive set of thermobarometers for lherzolites and related rocks.

Type Material: Museum of Mineralogy, University of Padova, Italy (MMP 20371).

References: (1) Brenker, F.E., F. Nestola, L. Brenker, L. Peruzzo, and J.W. Harris (2021) Origin, properties, and structure of breyite: The second most abundant mineral inclusion in super-deep diamonds. *Amer. Mineral.*, 106(1), 38-43.