Fassinaite $Pb_2^{2+}(S_2O_3)(CO_3)$

Crystal Data: Orthorhombic. *Point Group: 2/m 2/m 2/m*. Crystals prismatic {101}, to 0.4 mm, with flat chisel-shaped {*hk*0} terminations. As radiating aggregates of acicular crystals. Easily mistaken for anglesite, except for less-steep terminations on anglesite.

Physical Properties: *Cleavage:* None. *Fracture:* Irregular. *Tenacity:* Brittle.
Hardness = 1.5-2 D(meas.) = n.d. D(calc.) = 6.084

Optical Properties: Transparent. *Color:* Colorless; intense internal reflections. *Streak:* White. *Luster:* Vitreous to adamantine.
Optical Class: n.d. *n* = 2.13 *Birefringence:* Very high.

Cell Data: *Space Group: Pnma*. a = 16.320(2) b = 8.7616(6) c = 4.5809(7) *Z* = 4

X-ray Powder Pattern: Trentini mine, Veneto, Italy.
3.108 (100), 2.986 (82), 3.504 (75), 4.080 (62), 2.736 (60), 4.381 (59), 2.952 (49)

Chemistry:

	(1)	(2)
PbO	77.1(4)	76.11
SO_3	12.0(1)	
S^{2-}	4.83(1)	
SO		16.39
CO_2	7.60(4)	7.50
$-O = S^{2-}$	2.41(2)	
Total	99.2	100.00

(1) Trentini mine, Veneto, Italy; average of 11 electron microprobe analyses, thiosulphate and carbonate groups confirmed by Raman spectra, CO_2 calculated for stoichiometry, S^{6+}:S^{2-} ratio (1:1) on structural considerations; corresponding to $Pb_{2.01}(S_{1.82}O_3)(CO_3)$. (2) $Pb_2^{2+}(S^{6+}S^{2-}O_3)(CO_3)$.

Occurrence: A secondary mineral in the weathering zone of a polymetallic hydrothermal deposit.

Association: Galena, quartz, anglesite (Trentini mine, Italy); galena, cerussite, anglesite, sulfur, phosgenite (Erasmus adit, Austria).

Distribution: From the Trentini mine, Mount Naro, Vicenza Province, Veneto, Italy; from the Erasmus adit, Schwarzleo District, Leogang, Salzburg, Austria, and the Friedrich-Christian mine, Schapbach, Black Forest, Baden-Württemberg, Germany.

Name: Honors Bruno Fassina (b. 1943), an Italian mineral collector who found the first samples at the Trentini mine.

Type Material: Museum of Mineralogy, Department of Geosciences, University of Padova, Italy (MMP M10008); Natural History Museum, Vienna, Austria (N9055 and N 9056).

References: (1) Bindi, L., F. Nestola, U. Kolitsch, A. Guastoni, and F. Zorzi (2011) Fassinaite, $Pb_2^{2+}(S_2O_3)(CO_3)$, the first mineral with coexisting thiosulphate and carbonate groups: description and crystal structure. Mineral. Mag., 75(6), 2721-2732. (2) (2013) Amer. Mineral., 98, 1079-1080 (abs. ref. 1).