Cylindrite $Pb_3Sn_4FeSb_2S_{14}$

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Crystal Data: Triclinic. *Point Group:* $\overline{1}$. In concentric spherical or tubular shells and aggregates, up to 5 cm across and 2–3 cm in length, rarely terminated; also massive.

Physical Properties: *Cleavage:* {100}, excellent. *Tenacity:* Slightly malleable. Hardness = 2.5 VHN = 54–93 (100 g load). D(meas.) = 5.42–5.49 D(calc.) = 5.443

Optical Properties: Opaque. *Color:* In reflected light, galena-white. *Streak:* Black. *Luster:* Metallic. *Pleochroism:* Weak in air, stronger in oil. *Anisotropism:* Distinct, gray to pale yellowish or brownish gray.
R_1–R_2: (400) 34.5–40.3, (420) 34.3–40.1, (440) 34.1–40.1, (460) 33.6–39.8, (480) 33.1–39.4, (500) 32.5–38.9, (520) 31.8–38.3, (540) 31.2–37.8, (560) 30.7–37.2, (580) 30.3–36.7, (600) 29.9–36.3, (620) 29.6–35.9, (640) 29.3–35.5, (660) 28.9–35.1, (680) 28.6–34.7, (700) 28.4–34.4

Cell Data: *Space Group:* Two subcells are recognized, both $P\overline{1}$: the first (pseudotetragonal) has $a = 11.733(5)$ $b = 5.790(8)$ $c = 5.810(5)$ $\alpha = 90.00(0.20)°$ $\beta = 92.38(0.20)°$ $\gamma = 93.87(0.20)°$ Z = 2 and the second (pseudohexagonal) has $a = 11.709(5)$ $b = 3.670(8)$ $c = 6.320(5)$ $\alpha = 90.00(0.20)°$ $\beta = 92.58(0.20)°$ $\gamma = 90.85(0.20)°$ Z = 2

X-ray Powder Pattern: Poopó, Bolivia.
3.85 (100), 2.885 (100), 3.9 (90), 3.06 (65), 2.849 (65), 2.044 (65), 2.026 (65)

Chemistry:

	(1)	(2)	(3)	(4)
Pb	34.91	35.5	33.72	33.70
Sn	25.38	26.8	27.37	25.74
Fe	2.79	2.7	2.70	3.03
Ag	0.39	0.5		
Sb	12.64	12.0	11.68	13.20
S	23.86	23.3	24.68	24.33
Total	99.97	100.8	100.15	100.00

(1) Poopó, Bolivia; average of two analyses; corresponds to $Pb_{3.17}Sn_{4.02}Fe_{0.94}Ag_{0.07}Sb_{1.95}S_{14.00}$. (2) Do.; by electron microprobe; corresponds to $Pb_{3.30}Sn_{4.35}Fe_{0.93}Ag_{0.09}Sb_{1.90}S_{14.00}$. (3) Do.; by electron microprobe; corresponds to $Pb_{2.96}Sn_{4.19}Fe_{0.88}Sb_{1.75}S_{14.00}$. (4) $Pb_3Sn_4FeSb_2S_{14}$ [average from structure, not charge balanced; see ref. 3].

Occurrence: In tin-bearing hydrothermal veins.

Association: Franckeite, stannite, incaite, potosiite, teallite, jamesonite, boulangerite, cassiterite, galena, pyrite, sphalerite.

Distribution: In Bolivia, with fine examples from Poopó, in the Santa Cruz [TL] and Trinacria mines; at the Porvenir and Maria Francisca mines, Huanuni; from the Nueva Virginia vein, Colquechaca; and from the Purisima vein, all in Oruro; also from Llallagua, Potosí. In the Smirnovsk deposit, Transbaikalia, Russia.

Name: In allusion to its typical cylindrical habit.

Type Material: Mining Academy, Freiberg, Germany; The Natural History Museum, London, England, 84255.

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