Vurroite $Pb_{20}Sn_2(Bi, As)_{22}S_{54}Cl_6$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As fibrous crystals, to 0.4 mm., in divergent fibrous aggregates. *Twinning:* Twinning on (001).

Physical Properties: *Cleavage*: None. *Fracture*: n.d. *Tenacity*: n.d.
Hardness = n.d. D(meas.) = n.d. D(calc.) = 6.15

Optical Properties: Opaque. *Color*: Silver-gray; white in reflected light. *Streak*: n.d.
Luster: Metallic.
Optical Class: Biaxial (+). *Anisotropism*: Weak.
R: (470) 34.25, (546) 32.95, (589) 32.60, (650) 31.05

Cell Data: *Space Group: C*2/*c*. a = 8.371(2) b = 45.502(9) c = 27.273(6) β = 98.83(3)° Z = 4
Frequent twins and disordered domains in the structure were observed.

X-ray Powder Pattern: La Fossa crater, Vulcano Island, Italy.
2.07 (100), 3.34 (80), 2.85 (80), 2.69 (80), 2.10 (70), 3.17 (60), 2.17 (60)

Chemistry:

	(1)	(2)
Pb	40.92	43.86
Bi	28.30	24.33
As	8.38	8.72
Sn	1.60	2.51
Tl	0.06	
S	18.28	18.33
Se	0.18	
Cl	1.85	2.25
Br	0.24	.
Total	99.81	100.00

(1) La Fossa crater, Vulcano Island, Italy; average of 12 electron microprobe analyses, corresponding to $Pb_{18.95}Sn_{1.30}(Bi_{12.99}As_{10.73}Tl_{0.03})_{\Sigma=23.75}(S_{54.71}Se_{0.22}Cl_{5.00}Br_{0.29})_{\Sigma=60.22}$.
(2) $Pb_{20}Sn_2(Bi,As)_{22}S_{54}Cl_6$.

Occurrence: As encrustations around fumaroles (400-600 °C) in an active volcanic crater.

Association: Bismuthinite, lillianite, kirkiite, heyrovskýite, galena.

Distribution: Fumarole FF (and others), La Fossa crater, Vulcano Island, Italy.

Name: Honors Filippo *Vurro*, (b. 1940), Professor of mineralogy, University of Bari, Italy, and specialist in the mineralogy and geochemistry of modern volcanic deposits.

Type Material: Mineralogical Museum, University of Bari, Italy, (6/nm).

References: (1) Garavelli, A., N.N., Mozgova, P., Orlandi, E., Bonaccorsi, D., Pinto, Y., Moëlo, and Y.S. Borodaev, (2005) Rare sulfosalts from Vulcano, Aeolian Islands, Italy. VI. Vurroite, $Pb_{20}Sn_2(Bi,As)_{22}S_{54}Cl_6$, a new mineral species. Can. Mineral., 43, 703-711. (2) Pinto, D., E. Bonaccorsi, T. Balić-Žunić, and E. Makovicky (2008) The crystal structure of vurroite, $Pb_{20}Sn_2(Bi,As)_{22}S_{54}Cl_6$: OD-character, polytypism, twinning, and modular description. Amer. Mineral., 93, 713-727. (3) (2005) Amer. Mineral., 90, 1949-1950 (abs. ref. 1).