## Versiliaite $Fe_4^{2+}Fe_8^{3+}Sb_{12}^{3+}O_{32}S_2$



**Crystal Data:** Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Crystals, very rare, platy on {001}; commonly in massive aggregates.

**Physical Properties:** *Cleavage:* Perfect on {110}. Hardness = n.d. VHN = 330 (20 g load). D(meas.) = 5.12 D(calc.) = [5.32]

**Optical Properties:** Opaque. *Color:* Black. *Luster:* Metallic.
*Optical Class:* Uniaxial.
$R_1$–$R_2$: (470) 18.5–19.4, (546) 18.5–17.8, (589) 18.3–16.9, (650) 17.7–16.2

**Cell Data:** *Space Group: Pbam.* $a = 8.492(5)$ $b = 8.326(5)$ $c = 11.938(7)$ $Z = 1$

**X-ray Powder Pattern:** Buca della Vena mine, Italy.
3.196 (100), 3.167 (97), 2.972 (81), 2.682 (40), 1.946 (40), 1.652 (33), 5.94 (25)

**Chemistry:**

| | (1) | (2) |
|---|---|---|
| FeO | 11.70 | 10.62 |
| $Fe_2O_3$ | 14.92 | 23.59 |
| $As_2O_3$ | 4.63 | |
| $Sb_2O_3$ | 60.12 | 64.60 |
| ZnO | 2.96 | |
| S | 1.50 | 2.37 |
| $-O = S$ | 0.75 | 1.18 |
| Total | 95.08 | 100.00 |

(1) Buca della Vena mine, Italy; by electron microprobe, $Fe^{2+}$:$Fe^{3+}$ from crystal-structure analysis; corresponds to $Fe^{2+}_{4.65}Zn_{1.04}Fe^{3+}_{5.33}(Sb^{3+}_{11.76}As^{3+}_{1.34})_{\Sigma=13.10}O_{32}S_{1.33}$. (2) $Fe_4^{2+}Fe_8^{3+}Sb_{12}O_{32}S_2$.

**Occurrence:** In an iron ore deposit in barite formed by metasomatic processes at the contact between phyllites and dolostones.

**Association:** Schafarzikite, apuanite, derbylite, barite, magnetite, hematite, pyrite.

**Distribution:** In the Buca della Vena mine, northeast of Stazzema, Apuan Alps, Tuscany, Italy.

**Name:** For the Versilia Valley, Apuan Alps, Italy, where it was found.

**Type Material:** University of Pisa, Pisa, Italy, 3211.

**References:** (1) Mellini, M., S. Merlino, and P. Orlandi (1979) Versiliaite and apuanite, two new minerals from the Apuan Alps, Italy. Amer. Mineral., 64, 1230–1234. (2) Mellini, M. and S. Merlino (1979) Versiliaite and apuanite: derivative structures related to schafarzikite. Amer. Mineral., 64, 1235–1242. (3) Mellini, M., M. Amouric, A. Baronnet, and G. Mercuriot (1981) Microstructures and nonstoichiometry in schafarzikite-like minerals. Amer. Mineral., 66, 1073–1079.