

**Crystal Data:** Monoclinic. *Point Group:* 2/m. As elongate platy crystals to 100 μm and in aggregates, to 1 mm.

**Physical Properties:** *Cleavage:* Distinct on {001}. *Tenacity:* Brittle. *Fracture:* Irregular. Hardness = 3 D(meas.) = 3.77(2) D(calc.) = 3.75(2)

**Optical Properties:** Transparent to translucent. *Color:* Brown-red to dark reddish orange. *Streak:* Light brown. *Luster:* Adamantine. *Optical Class:* Biaxial (+).  $\alpha = 1.785(2)$   $\beta = 1.814(5)$   $\gamma = 1.854(5)$   $2V(\text{meas.}) = 85^\circ$   $2V(\text{calc.}) = 82.4^\circ$  *Dispersion:* Weak,  $r < v$ .

**Cell Data:** *Space Group:* C2/m.  $a = 9.043(1)$   $b = 6.2314(7)$   $c = 7.3889(9)$   $\beta = 116.392(2)^\circ$   $Z = 2$

**X-ray Powder Pattern:** Starlera Fe-Mn deposit, Val Ferrera, eastern Swiss Alps. 3.182 (100), 2.555 (100), 4.93 (80), 2.718 (80), 2.927 (70), 2.822 (70), 2.134 (70)

|                                |               |
|--------------------------------|---------------|
| <b>Chemistry:</b>              | (1)           |
| Na <sub>2</sub> O              | 0.08          |
| MgO                            | 3.95          |
| CaO                            | 12.42         |
| SrO                            | 0.20          |
| NiO                            | 1.07          |
| CoO                            | 0.19          |
| ZnO                            | 0.58          |
| Al <sub>2</sub> O <sub>3</sub> | 0.27          |
| Mn <sub>2</sub> O <sub>3</sub> | 16.70         |
| Fe <sub>2</sub> O <sub>3</sub> | 0.91          |
| As <sub>2</sub> O <sub>5</sub> | 53.41         |
| V <sub>2</sub> O <sub>5</sub>  | 0.67          |
| <u>H<sub>2</sub>O</u>          | <u>[8.84]</u> |
| Total                          | 99.29         |

(1) Starlera Fe-Mn deposit, Val Ferrera, eastern Swiss Alps; average of 6 electron microprobe analyses supplemented by Raman and IR spectroscopy, H<sub>2</sub>O calculated; corresponds to (Ca<sub>0.94</sub>Sr<sub>0.01</sub>Na<sub>0.01</sub>)<sub>Σ=0.96</sub>(Mn<sup>3+</sup><sub>0.90</sub>□<sub>0.52</sub>Mg<sub>0.41</sub>Ni<sub>0.06</sub>Fe<sup>3+</sup><sub>0.05</sub>Zn<sub>0.03</sub>Al<sub>0.02</sub>Co<sub>0.01</sub>)<sub>Σ=2.00</sub>(As<sub>1.97</sub>V<sub>0.03</sub>)<sub>Σ=2.00</sub>H<sub>4.16</sub>O<sub>10</sub>.

**Mineral Group:** Lotharmeyerite subgroup of the tsumcorite group.

**Occurrence:** In discordant veinlets formed by late-stage remobilization of arsenic during retrograde metamorphism of a carbonate-hosted, syngenetic exhalative massive braunite deposit.

**Association:** Calcite, tilasite, ailaufite.

**Distribution:** At the Starlera Fe-Mn deposit, Val Ferrera, eastern Swiss Alps.

**Name:** The prefix, *mangano*, alludes to the Mn<sup>3+</sup> dominance within the lotharmeyerite subgroup of the tsumcorite group.

**Type Material:** Geology Museum, Lausanne, Switzerland (MGL #54000 and MGL #54014).

**References:** (1) Brugger, J., S.V. Krivovichev, U. Kolitsch, N. Meisser, M. Andrut, S. Ansermet, and P.C. Burns (2002) Description and crystal structure of manganlotharmeyerite, Ca(Mn<sup>3+</sup>,□,Mg)<sub>2</sub>{AsO<sub>4</sub>,[AsO<sub>2</sub>(OH)<sub>2</sub>]}<sub>2</sub>(OH,H<sub>2</sub>O)<sub>2</sub>, from the Starlera Mn deposit, Swiss Alps, and a redefinition of lotharmeyerite. *Can. Mineral.*, 40, 1597-1608. (2) (2003) *Amer. Mineral.*, 88, 1627 (abs. ref. 1).