

**Crystal Data:** Monoclinic. *Point Group:* 2/m. Granular and as lamellae (to 0.5 mm wide) intergrown with triphylite or products of its topotactic oxidation.

**Physical Properties:** *Cleavage:* Good on {010}. *Fracture:* Irregular.  
*Tenacity:* Brittle. *Hardness* = ~5 *D(meas.)* = n.d. *D(calc.)* = 3.793

**Optical Properties:** Transparent. *Color:* Pinkish brown, colorless in transmitted light.

*Streak:* Colorless. *Luster:* Vitreous.

*Optical Class:* Biaxial (+).  $\alpha = 1.710(2)$   $\beta = 1.713(2)$   $\gamma = 1.725(5)$   $2V(\text{meas.}) = 54.2(2)^\circ$

$2V(\text{calc.}) = 53.4^\circ$  *Orientation:*  $X \parallel b$ ,  $Y \wedge a = 44.2^\circ$  in  $\beta$  obtuse,  $Z \wedge a = 35.0^\circ$  in  $\beta$  acute.

*Dispersion:*  $r < v$ , weak. *Pleochroism:* None.

**Cell Data:** Space Group:  $P2_1/c$ .  $a = 8.811(2)$   $b = 11.494(2)$   $c = 6.138(1)$   $\beta = 99.23(3)^\circ$   $Z = 4$

**X-ray Powder Pattern:** Calculated pattern.

2.874 (100), 2.858 (79), 3.506 (73), 2.717 (56), 2.953 (55), 2.916 (53), 2.899 (44)

Chemistry:	(1)	(2)
P <sub>2</sub> O <sub>5</sub>	40.02	39.81
FeO	27.31	40.03
MnO	26.06	19.89
MgO	0.66	
CaO	4.74	
ZnO	0.29	
Total	99.09	100.00

(1) Near Lutomia village, Lower Silesia, southwest Poland; average of 20 electron microprobe analyses supplemented by Raman and Mössbauer spectroscopy; corresponds to (Fe<sub>1.34</sub>Mn<sub>1.30</sub>Ca<sub>0.30</sub>Mg<sub>0.05</sub>Zn<sub>0.01</sub>) $\Sigma=3.00$ (PO<sub>4</sub>)<sub>1.99</sub>. (2) MnFe<sub>2</sub>(PO<sub>4</sub>)<sub>2</sub>.

**Polymorphism & Series:** Forms series with beusite and graftonite members of the group.

**Mineral Group:** Graftonite group.

**Occurrence:** A common primary phosphate in beryl-columbite-phosphate subtype of zoned rare-element pegmatites related to anatectic melts, generated by partial melting of metasedimentary-metavolcanics rocks during amphibolite-facies metamorphism and migmatization.

**Association:** Sarcopside, graftonite-(Ca), triphylite oxidized topotactically to ferrisicklerite and heterosite, alluaudite-group minerals, wolfeite, staněkite, whitlockite.

**Distribution:** From two quarries near Lutomia village, ~5 km southeast of Świdnica and ~60 km southwest of Wrocław, Lower Silesia, southwest Poland.

**Name:** The suffix indicates the <sup>M1</sup>Mn-analogue of *graffonite*, <sup>M(1)</sup>Fe<sup>M(2),M(3)</sup>Fe<sub>2</sub>(PO<sub>4</sub>)<sub>2</sub>.

**Type Material:** Mineralogical Museum, University of Wrocław, Faculty of Earth Science and Environmental Management, Institute of Geological Sciences, Wrocław, Poland (MMWr IV7927 and IV7928).

**References:** (1) Pieczka, A., F.C. Hawthorne, N. Ball, Y. Abdu, B. Gołębiowska, A. Włodek, and J. Żukrowski (2018) Graftonite-(Mn), ideally <sup>M1</sup>Mn<sup>M2,M3</sup>Fe<sub>2</sub>(PO<sub>4</sub>)<sub>2</sub>, and graftonite-(Ca), ideally <sup>M1</sup>Ca<sup>M2,M3</sup>Fe<sub>2</sub>(PO<sub>4</sub>)<sub>2</sub>, two new minerals of the graftonite group from Poland. *Mineral. Mag.*, 82(6), 1307-1322. (2) (2020) *Amer. Mineral.*, 105(7), 972-973 (abs. ref. 1). (3) Hawthorne, F.C. and A. Pieczka (2018) Classification of the minerals of the graftonite group. *Mineral. Mag.*, 82(6), 1301-1306.