Maneckiite $NaCa_2Fe_2^{2+}(Fe^{3+}Mg)Mn_2(PO_4)_6(H_2O)_2$

Crystal Data: Orthorhombic. *Point Group*: 2/*m* 2/*m* 2/*m*. As imperfect crystals (sometimes zoned) to ~150 μm.

Physical Properties: *Cleavage*: Good on {010}. *Tenacity*: Brittle. *Fracture*: Splintery. Hardness = ~ 5 D(meas.) = n.d. D(calc.) = 3.531

Optical Properties: Transparent. *Color*: Dark brown. *Streak*: Colorless. *Luster*: Vitreous. *Optical Class*: Biaxial (+). α = 1.698(2) β = 1.706(2) γ = 1.727(2) 2V(meas.) = 65.9(1.5)° 2V(calc.) = 64° *Orientation*: $X \parallel a$, $Y \parallel b$, $Z \parallel c$. *Dispersion*: Obscured. *Pleochroism*: X = dark green, Y = dark blue-green, Z = light brown/tan. Absorption: $X > Y > Z$.

Cell Data: *Space Group*: *Pcab*. a = 12.526(4) b = 12.914(5) c = 11.664(4) Z = 4

X-ray Powder Pattern: Michałkowa, Góry Sowie Block, Lower Silesia, southwestern Poland. 2.759 (100), 2.916 (78), 3.020 (68), 2.844 (35), 2.869 (31), 2.825 (30), 2.121 (30)

Chemistry:

	(1)
P_2O_5	42.45
Fe_2O_3	[8.65]
FeO	[15.19]
MnO	11.64
CaO	11.07
MgO	4.56
SrO	0.15
Na_2O	2.81
H_2O	[3.58]
Total	100.02

(1) Michałkowa, Góry Sowie Block, Lower Silesia, southwestern Poland.; average of 14 electron microprobe analyses, H_2O, FeO and Fe_2O_3 calculated for electroneutrality and the stoichiometry of the wicksite group; corresponds to $(Na_{0.91}\square_{0.09})_{\Sigma=1.00}(Ca_{1.98}Sr_{0.01})_{\Sigma=2.00}(Fe^{2+}_{1.77}Mg_{0.23})_{\Sigma=2.00}(Fe^{3+}_{1.09}Mg_{0.91})_{\Sigma=2.00}(Mn_{1.65}Fe^{2+}_{0.35})_{\Sigma=2.00}(PO_4)_6(H_2O)_2$.

Mineral Group: Wicksite supergroup.

Occurrence: In the outer zone of phosphate nodules. A product of Na- and Ca-metasomatism in a weakly fractionated anatectic lithium-cesium-tantalum pegmatite induced by a hydrothermal fluid in the presence of Al^{3+} from a neighboring aluminosilicate melt.

Association: Fluorapatite, wolfeite, Ca-rich graftonite, alluaudite-group minerals.

Distribution: From Michałkowa, Góry Sowie Block, Lower Silesia, southwestern Poland.

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Type Material: Mineralogical Museum, University of Wrocław, Wrocław, Poland (MMWr IV7674 and MMWr IV7677).

References: (1) Pieczka, A., F.C. Hawthorne, B. Gołębiowska, A. Włodek, and A. Grochowina (2017) Maneckiite, ideally $NaCa_2Fe_2^{2+}(Fe^{3+}Mg)Mn_2(PO_4)_6(H_2O)_2$, a new phosphate mineral of the wicksite supergroup from the Michałkowa pegmatite, Góry Sowie Block, southwestern Poland. Mineral. Mag., 81(3), 723-736. (2) (2018) Amer. Mineral., 103, 834 (abs. ref. 1).