Abswurmbachite (Cu, Mn$^{2+}$)Mn$^{3+}_6$SiO$_{12}$

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Crystal Data: [Tetragonal] (by analogy to braunite).  
Point Group: [4/m 2/m 2/m.]
Anhedral grains, to 50 μm.

Physical Properties:  Hardness = n.d.  
VHN = 870–950, average 920 (25 g load).
D(meas.) = n.d.  
D(calc.) = 4.96 (synthetic).

Optical Properties:  Opaque.  
Color: Black; gray in reflected light.  
Streak: Brownish black.  
Luster: Metallic.  
Anisotropism: Weak.

Cell Data:  
Space Group: \([I4_1/acd]\)  
\[a = 9.406(1)\]  
\[c = 18.546(3)\]  
\[Z = [8]\]

X-ray Powder Pattern:  
Synthetic \((\text{Cu}_0.98\text{Mn}_{0.02}^{2+})\Sigma_{-1.00}\text{Mn}_{3+}^{6}\text{SiO}_{12}\cdot\
2.702 (100), 1.6507 (30), 2.350 (15), 2.133 (15), 1.459 (14), 1.4016 (11), 1.6627 (10)

Chemistry:  
\[
\begin{array}{lcr}
\text{SiO}_2 & 10.1 \\
\text{TiO}_2 & 0.23 \\
\text{Al}_2\text{O}_3 & 0.58 \\
\text{Fe}_2\text{O}_3 & 4.7 \\
\text{Mn}_2\text{O}_3 & 72.1 \\
\text{CuO} & 11.6 \\
\text{MgO} & < 0.04 \\
\text{CaO} & 0.16 \\
\hline
\text{Total} & 99.47
\end{array}
\]

Polymorphism & Series:  Forms a series with braunite.

Occurrence:  In very low-grade, high-pressure metamorphic Mn, Al-rich quartzites.

Association:  Quartz, shattuckite, tenorite, sursassite, piemontite, ardennite, rutile, hollandite, 
clinochlore.

Distribution:  At Mili, Evvia Island, and Apikia, Andros Island, Cyclades Islands, Greece.

Name:  To honor Dr. Irmgard Abs-Wurmbach (1938–), German mineralogist.

Type Material:  Institute for Mineralogy, Ruhr University, Bochum, Germany; National 
Museum of Natural History, Washington, D.C., USA.

References:  (1) Reinecke, T., E. Tillmanns, and H.-J. Bernhardt (1991) Abswurmbachite, 
Cu$^{2+}$+Mn$^{3+}_{6}$[O$_8$/SiO$_4$], a new mineral of the braunite group: natural occurrence, synthesis, and 
(abs. ref. 1).