Oxy-foitite \[ \square(\text{Fe}^{2+}\text{Al}_2)\text{Al}_6(\text{Si}_6\text{O}_{18})(\text{BO}_3)_3(\text{OH})_3\text{O} \]

Crystal Data: Hexagonal.  \textit{Point Group}: 3\textit{m}.  As prismatic crystals to 1 cm, striated \parallel [0001].

Hardness = ~7  \textit{D(meas.)} = n.d.  \textit{D(calc.)} = 3.143

\textit{Optical Class}: Uniaxial (−).  \( \omega = 1.660(5) \)  \( \epsilon = 1.630(5) \)  \textit{Pleochroism}: \( \text{O} \) = dark brown, \( \text{E} \) = pale brown.

Cell Data: \textit{Space Group}: R3\textit{m}.  \( a = 15.9387(3) \)  \( c = 7.1507(1) \)  \( Z = 3 \)

X-ray Powder Pattern: Cooma Complex, New South Wales, Australia.  
3.466 (100), 2.579 (98), 2.953 (87), 6.357 (51), 2.041 (50), 3.990 (49), 4.220 (47)

Chemistry:  
\begin{tabular}{ll|ll}
\hline
 & \text{Oxy-foitite} & \text{Oxy-foitite} \\
 & \text{SiO}_2 & 35.67 & \text{ZnO} & 0.09 \\
TiO\textsubscript{2} & 0.22 & \text{CaO} & 0.06 \\
B\textsubscript{2}O\textsubscript{3} & [10.52] & \text{Na}_2O & 1.41 \\
\text{Al}_2O_3 & 36.49 & \text{K}_2O & 0.03 \\
FeO & [8.37] & \text{F} & 0.07 \\
Fe\textsubscript{3}O\textsubscript{5} & [1.15] & \text{H}_2O & [3.08] \\
\text{MgO} & 2.48 & \text{-} & \text{F}_2 & 0.03 \\
\text{MnO} & 0.36 & \text{Total} & 99.97 \\
\hline
\end{tabular}

\footnotesize{(1) Cooma Complex, New South Wales, Australia; average of 10 electron microprobe analyses supplemented by Fourier transform infrared spectroscopy, H\textsubscript{2}O and B\textsubscript{2}O\textsubscript{3} calculated from stoichiometry, FeO and Fe\textsubscript{2}O\textsubscript{3} calculated from FeO(total) = 9.40 and Mössbauer spectroscopic analysis; corresponds to \( \text{Y}([\text{Si}_{0.39}\text{Al}_{0.61}]\text{O}_{1.12})\text{Na}_{0.05}\text{Zn}_{0.01}\text{Ti}^{3+}_{0.02}\text{Fe}^{3+}_{0.05}\text{Mg}_{0.39}\text{O}_{2.66}][\text{Fe}^{3+}_{0.10}\text{Mg}_{0.55}\text{O}_{2.74}\text{OH}_{0.32}][\text{Fe}^{3+}_{0.12}\text{Mg}_{0.55}\text{O}_{3.20}\text{OH}_{0.31}]\text{OH}^{−}\text{O} \)}

Polymorphism & Series: Related to foitite through the substitution \( \text{Y}\text{Al}^{3+} + \text{W}\text{O}_2 \rightarrow \text{Y}\text{Fe}^{2+} + \text{W}(\text{OH})^{1−} \).

Mineral Group: Tourmaline supergroup, X-site vacant group.

Occurrence: From granitic pegmatite in high-grade migmatitic gneisses of pelitic composition. The oxy-foitite formation is related to the partial melting of these gneisses.

Association: Muscovite, K-feldspar, quartz.

Distribution: From the Cooma metamorphic Complex, New South Wales, Australia.

Name: Honors Franklin F. Foit Jr. (b. 1942), Washington State University, Pullman, Washington, USA, for his work on the tourmaline-supergroup. The prefix indicates OH\textsuperscript{−} dominance in the W-site.

Type Material: Museum of Earth Sciences, Department of Earth Sciences, Sapienza University of Rome, Italy (8829/84).

References:  