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Scandiobabingtonite, a new mineral from the Baveno pegmatite, Piedmont, Italy

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Abstract

Scandiobabingtonite, ideally $Ca_2(Fe^{2+},Mn)ScSi_5O_{14}(OH)$ is the scandium analogue of babingtonite; it was found in a pegmatitic cavity of the Baveno granite associated with orthoclase, albite, muscovite, stilbite, and fluorite. Its optics are biaxial (+) with $2V$ = 64(2)°, α = 1.686(2), β = 1.694(3), γ = 1.709(2). D_{meas} = 3.24(5) g/cm^3, D_{calc} = 3.24 g/cm^3, and Z = 2. Scandiobabingtonite is colorless or pale gray-green, transparent, with vitreous luster. It occurs as submillimeter sized, short, tabular crystals, slightly elongated on [001], and characterized by the association of forms {010}, {001}, {110}, {1 $\bar{1}$0}, and {101}. It occurs also as a thin rim encrusting small crystals of babingtonite. The strongest lines in the X-ray powder pattern are at 2.969 (S), 2.895 (S), 3.14 (mS), and 2.755 (mS) Å. The mineral is triclinic, space group $P\bar{1}$, with a = 7.536(2), b = 11.734(2), c = 6.748(2) Å, α = 91.70(2), β = 93.86(2), γ = 104.53(2)°. Scandiobabingtonite is isostructural with babingtonite, with Sc replacing Fe^{3+} in sixfold coordination, but no substitution of Fe^{2+} by Sc takes place. Due to the lack of a suitably large crystal of the new species, such a replacement has been confirmed by refining the crystal structure of a Sc-rich babingtonite (final R = 0.047) using single-crystal X-ray diffraction (XRD) data.