Thomas Witzke

Wakefieldite-(La), LaVO₄, a new mineral species from the Glücksstern Mine, Friedrichroda, Thuringia, Germany

An investigation of very small, prismatic, light pinkish to brown crystals from the long abandoned Glücksstern Mine, Gottlob hill, Friedrichroda, Thuringia, Germany, showed that they represent a new lanthan vanadate, LaVO₄, a member of the xenotime group and the La-analogue of wakefieldite-(Ce) and wakefieldite-(Y). Accordingly, the new mineral was named wakefieldite-(La). Both mineral and name have been approved by the IMA Commission on New Minerals, Nomenclature and Classification.

Until 1855, manganese and iron ores were mined at the Gottlob hill, Friedrichroda. The mineral occurs in hydrothermal baryte veins cutting a Lower Rotliegend (Autunian) conglomerate. The Gottlob hill is also the type locality for crednerite, CuMnO₂ (described 1847 by Credner), vésigniéite, BaCu₃(VO₄)₂(OH)₂ (described 1955 by Guillemin), and gottlobite, CaMg(VO₄)(OH) (Witzke et al., 2000).

Wakefieldite-(La) is associated with hausmannite, baryte and gottlobite. The mineral is grown in small vugs on pseudo-octahedral hausmannite as small freestanding crystals of 0.1 to 0.5 mm length. Wakefieldite-(La) is very rare, only 10 crystals have been found at present. The crystals show the pinacoid {001}, the prism {100} (probably), and sometimes possibly a dipyramid (indistinct). The mineral has a white streak, a Mohs hardness 4, an adamantine luster and is transparent to translucent. Wakefieldite-(La) shows no fluorescence in long- and short-wave UV, is uniaxial positive with ω and ε > 1.90, birefringence is medium, pleochroism E pale pinkish and O pale pinkish yellow.

WDX analysis yielded an empirical formula (La₀.₇₁Nd₀.₁₅Pr₀.₁₁Sm₀.₀₁Y₀.₀₁)Σ₀.₉₉V₁.₀₁O₄.₀₀, ideally LaVO₄. Empirical formulas for the highest and lowest measured La₂O₃ value are (La₀.₈₇Pr₀.₀₅Nd₀.₀₄Ca₀.₀₁U₀.₀₁)Σ₀.₉₈V₁.₀₁O₄.₀₀ and (La₀.₆₀Nd₀.₂₁Pr₀.₁₄Ce₀.₀₁Sm₀.₀₁Y₀.₀₁Ca₀.₀₁)Σ₀.₉₉V₁.₀₀O₄.₀₀. The calculated density for Z = 2 for the measured composition and cell from the X-ray powder data is 4.703 g/cm³ and for the end-member composition 4.727 g/cm³.

Refinement of the powder diffraction data gave the unit-cell parameters of an I-centred tetragonal cell with a = 7.406(6), c = 6.504(8) Å, V = 356.8(6) Å³. According to the single crystal structure analysis, wakefieldite-(La) has a zircon-type structure, space group I41/amd.