Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.30742

Scandium mineralization in a NYF-type pegmatite from Szklarska Poręba (Sudetes, Poland)

KAROLINA MIL[1], BOZENA GOLEBIOWSKA[1], SYLWIA ZELEK-POGUDZ[1], ADAM PIECZKA[1], BEATA MARCINIAK-MALISZEWSKA[2] AND TOMÁŠ MIKUŠ[3]

[1]AGH University of Krakow
[2]Faculty of Geology, University of Warsaw
[3]Earth Science Institute, Slovak Academy of Sciences

Scandium mineralization is significant due to its applications as an important raw material in modern industry. Currently, only 23 primary Sc minerals are known, but the element often substitutes Fe^{3+}, Fe^{2+}, Al or Mg in the structures of various other minerals, especially pyroxenes. In this summary, we focus on Sc mineralization identified in a small NYF-type pegmatite in the Szklarska Poręba quarry, located in the Variscan Karkonosze granite massif. This pegmatite is characterized by a diverse mineral assemblage, including W-Sn-Mo-Bi and Th-U-REE mineralization, with associated Nb- and Sc-bearing phases. Identified scandium minerals include: thortveitite, scandiobabingtonite, and the previously described kristiansenite. The first two occur in the form of fine-grained inclusions (50–100 μm) within W-Sn-Mo hydrothermal high-temperature mineralization, mainly in scheelite and cassiterite. The Sc_2O_3 content reaches up to 43.6 wt% in thortveitite and 11.8 wt% in scandiobabingtonite. These minerals are accompanied by much smaller inclusions (up to 20 μm only) of nioboixiolite-(Mn^{2+}) and -(Fe^{2+}), with a maximum Sc_2O_3 content of 6.8 wt%, and minerals of the samaraskite group, containing approximately up to 5 wt% Sc_2O_3. Previously, titanite and sorosilicate minerals: kozłowskiite and silesiaite, enriched in Sc were also described from this pegmatite (Pieczka et al., 2023; Mil et al., 2024). It is worth noting that these minerals, along with scandiobabingtonite and kristiansenite, contain Ca^{2+} in their structures. Additionally, scheelite contains a significant number of inclusions with Sc. The abundance of Ca,Sc-bearing minerals in this pegmatite indicates elevated calcium activity in hydrothermal fluids, which presumably was a factor controlling the precipitation and crystallization of some Sc-bearing minerals (Výravský et al., 2025). The primary source of scandium is most probably the mafic rocks of the Karkonosze pluton's metamorphic envelope, which were influenced by fluids containing F, Cl, and OH, increasing scandium mobility and transport to the post-magmatic system associated with the granite.

The research project was supported by program „Excellence initiative – research university" for the AGH University of Krakow.

[1] Mil, K., et al. (2024), Acta Geologica Polonica 74(3), e20.

[2] Pieczka, A., et al. (2023), Mineralogical Magazine 87(2), 271-283.

[3] Výravský, J., et al. (2025), Mineralogical Magazine, 1-17.