

THE FIRST OCCURRENCE OF NATIVE SELENIUM IN THE CARPATHIANS

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Native selenium was found during investigation of hydrothermal assemblages in sandstones of the Godulskie Beds in the Wisła-Oblaziec sandstone quarry (Outer Carpathians, the Beskidy Mts., Poland). Major minerals of the hydrothermal assemblage are: calcite, barite, quartz and pyrite. Elongated crystals of pyrite and goethite pseudomorphs after pyrite occur within calcite druses. Pseudo-tetragonal pyrite crystals, up to 5 mm in length, exhibit well developed (100), (010), (001) and (111) or (100), (010), (110) and (111) faces (Figs. 1–2). In reflected light, the crystals are anisotropic. BSE imagery revealed both sector and oscillatory zoning. Acicular native selenium crystals up to 25 μm occur on the surface of the goethite pseudomorphs after pyrite in association with platy barite (Figs. 3–5).

EDS spectra revealed very strong selenium peak (Fig. 6). Weak peaks of oxygen and iron seen in the spectra, most probably originated from the background goethite. Sample preparation for EPMA turned out to be challenging due to the small size of selenium crystals and their strong adherence to the highly porous surface

of goethite (Fig. 5). That may explain low analytical totals in electron microprobe analyses (Table 1).

Table 1. EPMA data for native selenium from Wisla.

Elements	wt%
Se	80.18
Fe	0.94
Ca	0.46
S	0.21
total	81.79

The origin of native selenium can be explained either by releasing traces of selenium from pyrite during its replacement by goethite and subsequent precipitation of selenium crystals or by the action of low-temperature Se-bearing fluids, from which selenium crystals precipitated on the porous surface of goethite. Spatial relationship between secondary goethite and native selenium favours the first possibility.

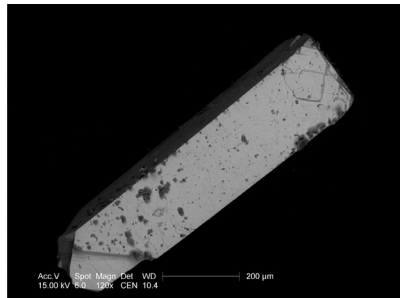


Fig. 1. Elongated pyrite crystal with (100), (010), (001) and (111) faces. BSE image.

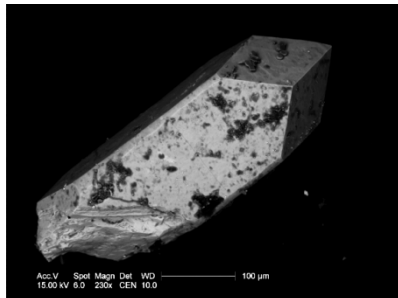


Fig. 2. Elongated pyrite crystal with (100), (010), (110) and (111) faces. BSE image.

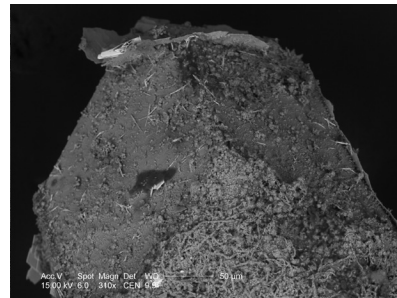


Fig. 3. Acicular native selenium crystals on the surface of the goethite pseudomorphs. BSE image.

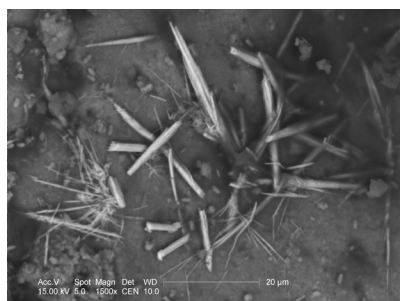


Fig. 4. Close-up of the aggregates of acicular native selenium crystals. BSE image.

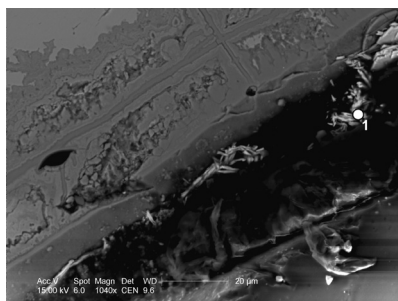


Fig. 5. Native selenium (bright) on the surface of goethite. (1) marks analysis 1 in Table 1. BSE image.

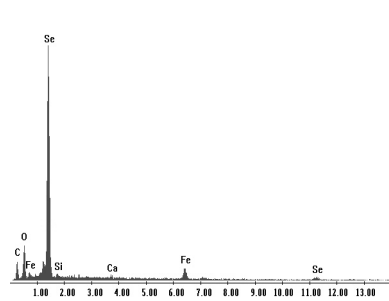


Fig. 6. EDS spectrum of native selenium analyzed in spot 1 on Fig. 5.