Re-Os age of late bornite-chalcopyrite vein ores, Kupferschiefer, SW Poland

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The age of the world-class Cu-Ag stratabound mineralization from the southern margin of the Upper Zechstein basin in Poland has been addressed using different geochronological methods. In general the ages of the Kupferschiefer's mineralized samples span from Lower Triassic to Lower Cretaceous [1] [3-5] [7-8]. Economic Cu mineralization transgresses sedimentary sequences and is hosted by Kupferschiefer black shale, underlying sandstone (*Rotliegendes*) and overlapping limestone of the Upper Permian marine sequence (*lower Zechstein*). Cu-Ag ores are represented mainly by Cu sulphides such as chalcocite, bornite, chalcopyrite and covellite which are commonly associated with silver admixtures and/or minerals. Four samples from the Lubin (-610 m b.s.l.) and Polkowice (-740 m b.s.l.) operating mines were acquired for Re-Os analyses. Analyzed samples consist of economic Cu ores characterized by 1-10 mm bornite ± chalcopyrite veinlets in calcareous shale (5-10 cm thick) rich in organic matter. In any single veinlet, bornite and chalcopyrite may occur in variable proportion, and penetrate along shale laminations as fine-grained (1-30 μm in diameter) disseminations and small aggregates (<50 μm). Within macroscopic veinlets where chalcopyrite is present, it forms symmetrical margins to a bornite interior. Bornite, bornite-chalcopyrite and/or chalcopyrite veinlets may cross-cut bedding or be nearly parallel to lamination in black shales. We report a Re-Os isochron age for bornite ± chalcopyrite veinlets that exhibit shallow cross-cutting features to bedding in black shale. A Model 1 regression yields 212 ± 7 Ma, with an initial $^{187}Os/^{188}Os$ ratio of 2.13 ± 0.31 (MSWD = 1.3). The analyzed bornite ± chalcopyrite veinlets have a Re concentration ranging from 5.7 to 12.1 ppb, and a total Os concentration ranging from 27-52 ppt. Significant common Os is present in all of the analyzed samples. The current Model 1 age suggests a higher initial $^{187}Os/^{188}Os$ than our previous result [4]. The origin of the Kupferschiefer mineralization is commonly attributed to multiple flow events of low-temperature oxidizing metalliferous fluids triggered by tectonic activation of basinal sediments (*e.g.* [2] [6]). Our results strongly suggest that the main Cu-mineralization event took place in the Late Triassic (Norian), *ca.* 212 ± 7 Ma. *The work was supported by grant No. N525 393739 from the Ministry of Science and Higher Education to SM.*

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