Geometallurgical Characterisation of Sediment-Hosted Cu-(Ag) Ore from the Spremberg-Graustein-Schleife Kupferschiefer Deposit, Germany

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The Spremberg-Graustein-Schleife Kupferschiefer deposit is a sediment-hosted stratabound copper (SSC) deposit located in eastern Germany. The Cu mineralization occurs at depths of 980 to 1,580 m below surface, predominantly in a Permian carbon-rich black shale unit, commonly known as the Kupferschiefer. Mineralization is not only restricted to this unit and can extend into the overlying Zechstein carbonates, as well as the underlying Redbed sandstones. Recent studies have confirmed 91.7 Mt of inferred mineral resource at an average grade of 1.5% Cu and 24.0 g/t Ag.

In addition to Cu and Ag, elevated levels of Co, Ni, and Re are also found in Kupferschiefer ores. This contribution provides the first detailed evaluation of the mineralogy of the complete mineralization interval of the Spremberg-Graustein-Schleife deposit, including the mineralogical deportment of Cu. Mineral chemistry work constraining the deportments of Ag and Re is planned.

Fifty-three individual samples were collected from three drill cores. The samples were crushed, milled, and composited into 19 composite samples. These were then subjected to multi-element analytical methods (XRF, ICP-OES, ICP-MS) for bulk-ore geochemistry, X-ray diffractometry (XRD), and mineral liberation analysis (MLA) for mineralogy. Electron probe micro-analysis (EPMA) and laser ablation ICP-MS (LA-ICP-MS) for trace element geochemistry are currently planned. Mineralogical results reveal that major Cu-bearing minerals vary both spatially between the three different drill cores and vertically between lithological units. For example, chalcocite and covellite (and to a lesser extent bornite) are the dominant carriers of Cu in the most mineralized core (80% of contained Cu), whereas chalcopyrite is the most prominent carrier of Cu in the Pb-Zn Kupferschiefer facies (75% of contained Cu). By combining different analytical results, we aim to develop a quantitative predictive model to describe the mineralogical distribution of the copper and potential by-products that will be usable for mineral processing and mine-planning purposes.