

THE HIGH-TECH METAL POTENTIAL OF PB-ZN MINERALIZATIONS IN THE EASTERN ALPS

Onuk, P.¹ & Melcher, F.¹

¹Lehrstuhl für Geologie und Lagerstättenlehre, Montanuniversität Leoben (Peter-Tunner-Straße 5, 8700, Leoben, Austria)

e-mail: peter.onuk@unileoben.ac.at

The “Ad-Hoc working Group on defining critical raw materials” of the European Union (EU) has identified twenty commodities as being critical; some of them are used in high-technology products and green technologies (EU, 2014). Austria hosts numerous mineralizations with significant potential of the rare high-tech metals germanium, gallium, indium and cobalt, as indicated by chemical data of sulphide ore concentrates. In the beginning of the 1990s, the long-lasting experience of Austrian companies in base metal mining from domestic sources was terminated by the closure of the zinc-lead mine at Bleiberg-Kreuth. Zinc, copper, lead and silver were the major commodities mined in deposits within Austria.

Erich Schroll was the first to analyze trace metals in domestic ores (SCHROLL, 1954; CERNY & SCHROLL, 1995). Modern, systematic research using state-of-the-art analytical methods, however, is almost completely missing. First LA-ICP-MS data from sphalerite, which is a major host for some high-technology metals, are presented as part of a re-evaluation of three major types of base metal deposits in the Eastern Alps.

- (1) Carbonate-hosted “Alpine-type“ or “Bleiberg-type“ deposits hosted by Triassic limestones and dolomites are characterized by low Fe, high Cd (~2000 ppm), Ge (200-400 ppm) and Tl concentrations (~100 ppm) in sphalerite and by the absence of Co, Cu, Ni and Ag.
- (2) Sedimentary exhalative deposits such as those found in the Pb-Zn district of the Graz Paleozoic formed during the Lower Devonian in an euxinic environment and are associated with submarine alkaline volcanism (WEBER, 1990). Our LA-ICP-MS investigations of sphalerite collected in the Silberberg exploration adit indicate up to 9 ppm Ge, 8 ppm Ga, 7 – 17 ppm In, 3-93 ppm Co, ~4wt% Fe and 2000 ppm Cd.
- (3) Vein deposits of different genesis and age are widespread in the Eastern Alps. Pb-Zn-mineralization at Meiselding located in the Gurktal Nappe is classified as a metamorphically overprinted SEDEX deposit, whereas the Pb-Zn mineralization of Vellach-Metnitz in the same tectonic unit shows vein-like NW-SE trending structures (WEBER, 1997). High indium concentrations have been previously reported for the Zn-Cu-Pb veins of Koprein (Paleozoic of the Karawanken Range). LA-ICP-MS analyses of sphalerite show between 10 and 40 ppm In (maximum 300 ppm), Ge up to 2 ppm, Ga up to 10 ppm, Co 250 - 850 ppm, Cd 1120 - 3560 ppm, and Fe 2.8 – 6.5 wt%.

The re-evaluation of the most significant base metal sulphide occurrences in the Eastern Alps will provide valuable data for strategic planning related to the use of domestic resources.

CERNY, I., SCHROLL, E., (1995): *Archiv für Lagerstättenforschung Geologische Bundesanstalt*, 18, pp 5-33

EU (2014) : <http://ec.europa.eu/enterprise/policies/raw-materials/files/docs/crm-report>

SCHROLL, E., (1954): *Mitteilungen der Österreichischen Mineralogischen Gesellschaft, Sonderheft 3*, Wien

WEBER, L., (1997): *Archiv für Lagerstättenforschung Geologische Bundesanstalt*, 19, pp 1-607