RADIOMETRIC DATING OF THE MOLYBDENUM DEPOSIT REICHENSPITZE, TYROL

Doppelmayer, D.[1], Melcher, F.[1], Gallhofer, D.[2], Sorger, D.[2,3]

[1]Lehrstuhl für Geologie und Lagerstättenlehre, Montanuniversität Leoben,
Peter-Tunner Straße 5, 8700 Leoben, Austria
[2]Institute of Earth Sciences, Universität of Graz, Universitätsplatz 2/II, 8010 Graz, Austria
[3]Present adress: Geoscience Center, Georg-August-University Göttingen,
Goldschmidtstraße 1, Göttingen 37077, Germany
e-mail: frank.melcher@unileoben.ac.at

The occurrence of molybdenum at Reichenspitze in Salzburg and Tyrol is part of the molybdenum ore province Zentralgneis Supersuite in the Tauernfenster. At the Reichenspitze, molybdenite (MoS_2) is restricted to aplitic intrusions in the Zentralgneis. These aplitic granites are also referred to as Reichenspitz granite. Up to now no reliable age of the Reichenspitz granite has been published. In this study, U-Pb zircon dating (LA-ICP-MS) yields a crystallization age of 292.2 ± 0.68 | 3.9 Ma for the aplitic granites. This puts the Reichenspitz granite directly into relation with the Lower Permian I-Type granitoids of the Zillertal-Venediger-Tux magmatic suite. Geochemical analyses of the aplitic granite show high SiO_2 contents (77 to 79 wt.%), barium contents of 141 to 233 µg/g, and rubidium contents of 147 to 171 µg/g. Based on low CaO contents (< 1.65 wt.%), a negative barium anomaly (normalized to ocean ridge granites), and high Rb/Sr ratios (up to 5.93), the Reichenspitz granite was previously interpreted as an A-type granite. The analyzed samples of the Reichenspitz granite also show low CaO contents (< 0.8 wt.%), a weak negative barium anomaly, and high Rb/Sr ratios (up to 4.25). However, a K/Rb - Rb discrimination diagram indicates a differentiation trend from granites in the Tux Core to the Reichenspitz granite. The Reichenspitz granite is therefore interpreted as a highly differentiated granitoid of the Zillertal-Venediger-Tux magmatic suite. Typological studies of the investigated zircons yield calc-alkaline, highly fractionated magma sources. Crystallization temperatures of 600 to 650 °C are presumed. Additionally U-Pb uraninite dating was carried out in this study. Though the crystallization age of the uraninites could not be precisely determined, the polygenetic zircon grains show younger ages than the published Lower Permian zircon age. The youngest uraninite generation shows consistent ages of 29 ± 5 Ma, which dates the Oligocene Neo-alpine regional metamorphism. Based on the new geochronological data a primary ore formation syngenetic with the intrusion of the Reichenspitz granite is proposed. In the highly fractionated melt, volatile elements (F, Cl) and molybdenum were enriched. This process generated metal-bearing, possibly pneumatolytic fluids which overprinted the host rock and led to metasomatic ore formation. Hydrothermal activity during the Alpine regional metamorphism remobilised the ore, which locally led to molybdenite enrichment as aggregates along shear zones. The Reichenspitze deposit strongly resembles the molybdenum deposit Ackley in Newfoundland, which is also related to aplitic granites in the roof zone of a magma chamber. A genetic relation between the Reichenspitze molybdenum occurrence and the molybdenum deposit Alpeinerscharte/Tyrol dated at 305 Ma (Langthaler et al., 2004) cannot be excluded but calls for further investigations.

LANGTHALER, K., RAITH, J.G., CORNELL, D., STEIN, H., MELCHER, F. (2004): Miner. Petrol., 82, 33-64.