

Magnesite in carbonate and siliciclastic rocks of the Hochfilzen mining district (Eastern Alps, Austria): relatives or strangers?

**FERDINAND J. HAMPL¹, VIKTOR BERTRANDSSON
ERLANDSSON¹, MONIKA FEICHTER¹, GERD
RANTITSCH¹, PETER TROPPER², RONALD J. BAKKER¹,
RÓBERT ARATÓ¹, JULIA WEILBOLD³, JOHANN G.
RAITH¹ AND CHRISTOPH STRANZL⁴**

¹Montanuniversität Leoben

²University of Innsbruck

³GeoSphere Austria

⁴Veitsch Radex GmbH & Co OG

Carbonate-hosted sparry magnesite is the most important raw material for magnesia (MgO) in refractories, which are essential for the metal industry. Several occurrences of this commodity in the Eastern Alps have been mined and investigated for many decades, but there is still no consensus on their formation. One of them is the Hochfilzen mining district (Tyrol, Austria) where magnesite is associated with Silurian to Devonian dolostones and with Permian breccias in the hanging wall. Up to now, it is unclear if these two magnesite groups are genetically related. To investigate their relationship and improve our understanding of magnesite formation in the Eastern Alps, we used electron microprobe analysis, laser ablation inductively coupled plasma-mass spectrometry, micro-X-ray fluorescence mapping and Raman spectroscopy.

The deposits of the carbonate-hosted, finely crystalline magnesite display a characteristic succession of metasomatic replacement of dolomite by magnesite and a post-formational retransformation of magnesite to dolomite. The latter stage is also accompanied by the formation of anhydrite, Ca-rich dolomite and calcite. The magnesitized dolomite clasts of the Permian red beds in the hanging wall of the magnesite deposits show similar paragenetic and morphological features as the magnesite mineralization in the mines. However, partial magnesitization of the breccia's matrix and magnesite rimming dolomite clasts are testimony to the metasomatic in-situ formation of magnesite and a rebuttal of magnesite redeposition from the deposits. Additionally, the trace elements in both magnesite groups indicate a common formation merely differing in stratigraphic position. Finally, both magnesite groups were overprinted by regional metamorphism at 286 ± 27 °C and the comparison with coarsely crystalline magnesite from other occurrences in the Eastern Alps shows that metamorphic temperatures do not control the magnesite crystal size.

By combining investigations of magnesite in different lithologies and stratigraphic units we present a novel perspective on magnesite formation in the Eastern Alps and a direction for future studies.

This work was funded by the European Union under the Horizon Europe grant No. 101091374 of the MultiMiner project: