

# New insights on the Agnmyrgruvan Pb-Zn deposit in central Sweden from microscopy, UV-light imaging, and LA-ICP-MS

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Located on the Sollerön island in the Siljan Lake (central Sweden), the carbonate-hosted Pb-Zn (CHPZ) Agnmyrgruvan deposit is believed to be associated with the Siljan meteorite impact at around 377 Ma (Reimold et al. 2005). Along with the nearby Boda CHPZ deposits, the colloform sphalerite of the Agnmyrgruvan deposit was previously studied by Welin (1959), who compared the deposits to the Bleiberg deposit in Austria. Alpine-type CHPZ deposits (including Bleiberg, Mežica, and Raibl) contain colloform sphalerite that has been shown to host high amounts of critical metals, in particular Ge (Melcher et al. 2023; and references therein). With the rising interest in critical metals, the Nordic CHPZ deposits should be revisited to better the understanding of the distribution of these critical metals in sphalerite.

This study combines optical and electron beam microscopy, laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS), Raman spectrometry, and ultraviolet (UV) light imaging to constrain formation processes of the Agnmyrgruvan deposit and investigate the distribution of critical metals in the colloform sphalerite. Raman spectrometry was used to investigate the presence of wurtzite, but the results were inconclusive. Individual bands of sphalerite show different luminescence colors under UV-light, such as yellow and orange, but also black (no luminescence). Trace element compositions vary significantly (e.g., Mn, Fe, Cu, Ga, Ge, As, Cd, Tl, and Pb) between the different colored bands of the colloform sphalerite. Sphalerite trace element geothermometry indicates formation temperatures between 130–190 °C, which is in accordance with the interpreted temperature by Welin (1959) of <200 °C. Furthermore, the Agnmyrgruvan deposit's unique association with a meteorite impact will contribute to the currently ongoing international work on CHPZ sphalerite trace element geochemistry, where such CHPZ deposits are lacking.

## References

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