

## **Molybdenite from the Palaeoproterozoic REE-Line in Bergslagen, Sweden: Textural Relations, Trace Element Chemistry, and Re-Os Age Data**

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The REE-line in the Bergslagen ore province in Sweden hosts the so-called Bastnäs-type REE deposits, which comprise a suite of skarn-hosted magnetite-dominated iron oxide deposits associated with locally REE-rich and polymetallic mineralisation (e.g., Cu, Co, Bi, Mo, Au). They are generally interpreted as replacements of interlayered carbonate rocks within a volcano-sedimentary sequence by high-temperature Fe-REE-rich fluids at c. 1.9 Ga. The associated polymetallic mineralisation has been known and documented previously but not studied in detail. In this study, we characterise molybdenite from different REE deposits in the REE-line by textural studies combined with trace element chemistry and Re-Os ages by LA-ICP-MS/MS.

Molybdenite is commonly associated with chalcopyrite ± pyrrhotite ± pyrite ± bismuthinite as well as other ore minerals, including Co-rich ones, and occurs in several textural and paragenetic settings: 1) associated with allanite group minerals in irregular fracture fillings, veins or bands in different skarn assemblages, locally crosscutting earlier recrystallised cerite-(Ce) and bastnäsite-(Ce) ore in Nya Bastnäs, 2) within hydrothermally Mg- or Mg-K-altered volcanic rocks, now manifested by metamorphosed mineral assemblages like quartz-anthophyllite or biotite-garnet, 3) within carbonate rock carrying serpentine-dominated pseudomorphs (“ophicalcite”) associated with magnetite, or 4) within tremolite-actinolite-magnetite skarn assemblages.

The trace elements Re, W, Se, and locally Te could be identified as being contained in molybdenite, whereas higher concentrations of other elements likely represent inclusions, including Bi-Pb-Cu-Te-Au-bearing and locally REE-bearing phases. Rhenium concentrations range from below 1 to c. 20 ppm. Preliminary LA-ICP-MS/MS data of samples with higher Re concentrations yield Re-Os ages of 1904±17 Ma (Bondgruvan), 1857±17 Ma (Gamla Bastnäs) and 1838±30 Ma (Malmkärragruvan), consistent with published N-TIMS ages. The combined results thus far suggest multiple generations and types of molybdenite mineralisation and associated polymetallic mineralisation during the evolution of the Svecokarelian orogeny.