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Hydrothermal low-T in-situ formation of mm-sized euhedral monazite-(Ce) and synchysite-(Ce) within decomposing pegmatitic allanite-(Ce) megacrystals.

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Pegmatitic material within a postglacial landslide near Rauris, Salzburg Province, Austria (Lohning quarry), contains large allanite-(Ce) crystals. Meixner (1971) speculated that the allanite from this pegmatite could be the source for younger REE mineralization within “Alpine” clefts and fissures, for which this area is well known. The allanite-(Ce) forms long-prismatic, brownish-black crystals and aggregates up to more than 10 cm in length, which are enclosed in coarse-grained pegmatitic quartz and microcline. Most of the allanite is partially altered and replaced, to varying degrees, by yellowish to greenish brown, fine-grained mixtures of muscovite + bastnäsite-(Ce) [Ce(CO_3)F] / synchysite-(Ce) [CaCe(CO_3)$_2$F] + calcite + hematite $\pm$ monazite-(Ce). Some of these pseudomorphs have been leached out leaving behind elongated, hollow cavities. The walls of these cavities are lined with crystals of synchysite-(Ce) and, more rarely, monazite-(Ce). Both minerals are associated with altered Fe-carbonates. Synchysite-(Ce) forms up to 1 cm long orange-yellow to brownish-yellow crystals with a pseudohexagonal habit. These crystals are striated parallel to {0001} and probably represent syntactic intergrowths with bastnäsite-(Ce). Monazite-(Ce) is mostly associated with schorl-dravite and shows a wide range of colors and morphology. These include common brownish-yellow to orange-yellow crystals with a wedge-shaped habit and {100}, {010} and {-111} crystal faces. Some monazites also have a very thin reddish coating, which chemically corresponds to a Ca-Th-phosphate (probably cheralite or brockite).

The results from this study suggest that REE are relatively immobile during hydrothermal processes and reprecipitate in situ as monazite or synchysite, during alteration of allanite (Krenn & Finger 2007). In contrast, pinkish crystals of monazite, with a tabular habit, have formed in albite- and adularia-rich fissures from the same quarry. The absence of preexisting allanite in these fissures suggests that alkaline fluid could help to greatly facilitate the long distance mass transport of REE.

References

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