

Precipitation of smithsonite on calcite and aragonite grown in porous media

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Smithsonite and other zinc carbonates can form as secondary minerals in the weathering zone of zinc ore deposits. They frequently occur as replacement bodies in carbonate rocks and can themselves constitute a zinc ore. Despite this economic interest, the phase relationships in the Zn^{2+} - Ca^{2+} - CO_3^{2-} - H_2O and the replacements of calcite or aragonite into smithsonite are still deficiently understood.

In this experimental work, calcite single crystals and aragonite sphaerulitic aggregates have been precipitated in a silica hydrogel system by chemical reaction of Na_2CO_3 and CaCl_2 at ambient conditions in the presence of aqueous Zn^{2+} . After calcium carbonate precipitation, smithsonite is observed to grow on both calcite and aragonite. The zinc excess also precipitated as $\text{Zn}(\text{OH})_2$.

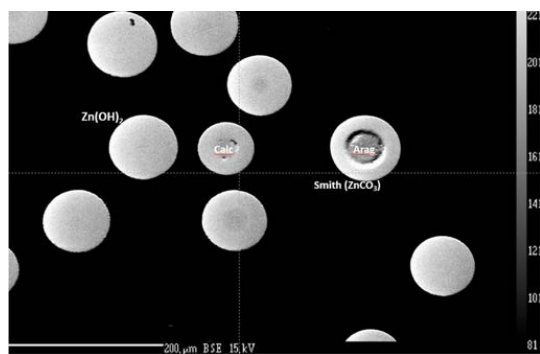


Figure 1: Crystals and aggregates of aragonite, calcite, smithsonite and $\text{Zn}(\text{OH})_2$ precipitated in silica hydrogel.

Solid phases have been identified by micro-X-ray diffraction and micro-Raman spectroscopy. Morphological, crystallographic and compositional relationship between calcium and zinc carbonates have been studied by SEM and electron microprobe.