

Nanoscale observations of the effect of citrate on calcium oxalate precipitation on calcite surfaces.

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Calcium oxalate ($\text{CaC}_2\text{O}_4 \cdot x\text{H}_2\text{O}$) minerals are naturally occurring minerals found in fossils, plants, kidney stones and is a by-product in some processes such as paper, food and beverage production [1,2].

In particular, calcium oxalate monohydrate phase (COM) also known as whewellite ($\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$), is the most frequently reported mineral phase found in urinary and kidney stones together with phosphates.

Organic additives are well known to play a key role in the formation of minerals in both biotic and abiotic systems, either facilitating their precipitation or hindering it. In this regard, recent studies have provided direct evidence demonstrating that citrate species could enhance dissolution of COM and inhibit their precipitation. [3,4]

The present work aims at evaluate the influence of pH, citrate and oxalic acid concentrations in calcium oxalate precipitation on calcite surfaces (Island Spar, Chihuahua, Mexico) through in-situ nanoscale observation using *in situ* atomic force microscopy (AFM, Multimode, Bruker) in flow-through experiments.

Changes in calcium oxalate morphologies and precipitated phases were observed, as well as the inhibitory effect of citrate on calcium oxalate precipitation, which also lead to stabilization an the amorphous calcium oxalate phase.

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