

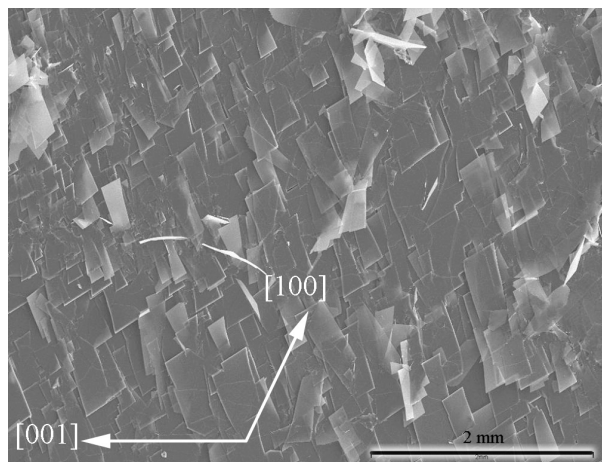
Oriented overgrowth of brushite ($\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$) on gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)

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At slightly acidic conditions and 25° C, the interaction between aqueous solutions containing dissolved P(V) and gypsum results in surface precipitation of brushite ($\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$) crystals. These crystals grow oriented onto gypsum's surface, forming an epitaxy. Using an *A*-centered unit-cell setting for both brushite (*Aa*) and gypsum (*A2/a*), the determined epitaxial relation is $(010)_{Gy} \parallel (010)_{Br}$, $[001]_{Gy} \parallel [001]_{Br}$, and $[100]_{Gy} \parallel [100]_{Br}$. In the performed experiments, the obtained morphologies of brushite consist of thin crystals elongated in the [101] direction with {010}, {111} and {111} as major forms. In the present work, both crystal morphology and epitaxial orientation are approached on the basis of the bond arrangement within the structure of both mineral phases.

Figure 1: SEM image of thin brushite crystals oriented onto gypsum's (010) face, along [101] direction.



Sequential Metal Extraction procedure as applied to sediments in Acid Mine Drainage environments (Aljustrel, Portugal)

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Acid Mine Drainage (AMD) is a serious environmental concern caused by mining activities and presents severe consequences to surface and underground water systems. In this work we have studied the partitioning of trace metals in sediments from AMD systems in the area surrounding the Aljustrel Mines (Iberian Pyrite Belt), using a modified Sequential Metal Extraction (SME) procedure.

Authors acknowledge that SME methods are useful to study metal partitioning in sediments. However, there are several problems with these methods, including the one of Tessier *et al.* (1979). Among these are: trace element redistribution among phases, nonselectivity of extractants, and sulphide dissolution during organic matter oxidation steps. In order to overcome these difficulties the proposed method combines modifications from Hirner (1996) and Breward *et al.* (1996). The oxidation of organic matter is performed separately by first extracting it from the sediment. The six-step sequential extraction procedure was performed on streambed sediments of Ribeira de Água Forte (Aljustrel). The extractant solutions were analysed by AAS for selected trace metals (Cu, Zn, Pb, Ni, Cd, and Co).

Cu, Pb, and Zn have the highest averaged relative concentrations in the sediments (51%, 27%, and 14%, respectively). Ni, Cd and Co exhibit low values (< 4%). In contrast to these results in the sediments, water analyses show higher Zn concentrations in relation to Cu, suggesting a preferential sediment-water partitioning for Cu. Also shown is the anomalous character of an iron-rich sample in relation to the correspondent water, where a peak in all elements is observed. This sample is also exceedingly anomalous in Cu for reasons currently unknown to us. In relation to the different phases, organic matter has no important role in the adsorption processes (1,7%). Trace metals occur preferentially bound to iron oxide phases (70%), followed by non-specific adsorption (25%).

References

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