Mg^{2+} induced crystal branching phenomena in calcite

FELIX WIETHOFF* AND JÜRGEN SCHREUER

[1]Ruhr-University Bochum, Universitätsstrasse 150, 44801 Bochum, Germany (*correspondence: felix.wiethoff@rub.de)

Systematic undulosity in calcites (radiaxial fibrous calcite, RFC) is well known for decades but the underlying mechanisms and processes of their formation on a microstructural scale are still poorly understood [1]. To improve the application of such archives for climate reconstruction a better knowledge of their formation and possible alteration scenarios is necessary.

In Mg^{2+} containing gel based calcite growth experiments we observed pronounced crystal branching phenomena and complex pathological morphologies (see Fig. 1). From optical microscopy and EBSD pole-figures we derived that the branched sub-units are not parallel to their substrate, resulting in systematic undulous extinction behavior under cross polarized light. We assume that the incorporation of impurities is the principal cause for establishing of an ordered dislocation network which leads to this tilted sub-units. We will present hypotheses explaining the systematic inhomogeneous distribution of Mg^{2+} during calcite growth based on observations of sector zoning in calcites [2] and selective incorporation at non-equivalent step-edge geometries [3].

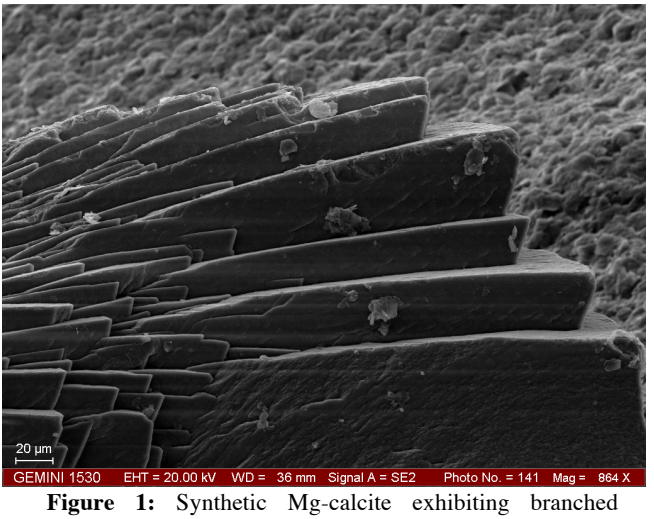

Figure 1: Synthetic Mg-calcite exhibiting branched subunits which results in undulous extinction phenomena in thin section.

[1] Richter et al. (2011) *Sediment. Geol.* **239**, 23-36 [2] Reeder & Paquette (1989) *Sediment. Geol.* **65**, 239-247 [3] Davis et al. (2004) *Am. Min.* **89**, 714-720