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Presentation abstract

The influence of silica in calcium carbonate growth is of interest in the fields of material science, geochemistry and early life science. In this work, counter-diffusion in silica gel experiments, with two different setups, and in alkaline silica-rich solutions show that silica has a strong influence on calcite morphogenesis. Parameters screened are pH, calcium and carbonate concentrations and gel density (or silica concentration in solutions). The description and categorisation of obtained morphologies as a function of those parameters and time is the first step to understand the influence of silica in calcium carbonate morphogenesis. Interestingly, some experiments yielded self-organised calcite structures with complex curved features similar to those of biotic calcite, that had never been observed in completely inorganic conditions to this day. The discovery of abiotic and inorganic biomimetic calcite has implication in the detection of ancient microfossils, calcite being the most abundant biomineral on Earth, and answers the old question of the inability of calcite to show such features as other carbonates. The texture of those new-discovered calcite biomorphs is composed of oriented nanorods, as already observed with witherite biomorphs (BaCO 3), suggesting the same interdependent amorphous silica and calcite precipitation coupling formation mechanism.