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Biomimetic control of crystal assembly by growth in an organic hydrogel network

OLAF GRASSMANN,[1] REINHARD B. NEDER,[2] ANDREW PUTNIS,[3] AND PEER LÖBMANN[1,*]

[1]Lehrstuhl für Silicatchemie, University of Würzburg, Röntgenring 11, D-97070 Würzburg, Germany
[2]Mineralogisches Institut, University of Würzburg, Am Hubland, D-97074 Würzburg, Germany
[3]Institut für Mineralogie, University of Münster, Corrensstraße 24, D-48149 Münster, Germany

ABSTRACT

Calcite aggregates are mineralized in an organic poly-acrylamide hydrogel using a counter diffusion arrangement. The particles obtained show a characteristic pseudo-octahedral morphology, which is unexpected for calcite crystals. Scanning and transmission electron microscopy reveal a microstructure composed of individual highly aligned calcite crystallites. Although the aggregates consist of independent crystallites, the X-ray diffraction patterns suggest calcite single crystals. By analogy with some biominerals, the inorganic assembly is intergrown with an organic hydrogel network. A specific model is proposed for growth of the aggregate.