

Mimicking biomineralisation using peptoid templating

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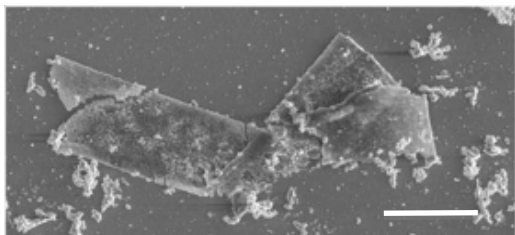
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In biomineralizing systems, biopolymers play both a controlling role for the nucleation and growth processes of e.g. calcium carbonate (CaCO_3) and dramatically improve mechanical properties of organic-inorganic biocomposite over the individual constituents. Inspired by the brick-and-mortar structure in nacre, we have produced a functional organic scaffold that template distinct layer formation of CaCO_3 (Figure, scale 10 μm).

We have used peptoid nanosheets as a biopolymeric scaffold that span a surface area of up to 100 μm by 20 μm and have a thickness of a few nm. The nanosheets are formed by B28 peptoid polymers (poly-N-substituted glycines) composed of 28 units. Assembled the nanosheets expose a high density of primary amines and carboxylic acid on their surfaces. We have investigated the nucleation and growth processes of CaCO_3 when mixed with the nanosheets using a constant composition setup and a batch reactor system. Using the different driving force for nucleation and growth, as given by our different setups, we can obtain and stabilize ACC or small vaterite subparticles on the sheets surfaces.



Our composite and method holds potential for templating detailed structures and morphologies of CaCO_3 in new composite materials.