The crystal structure and microstructure of biogenic and bio-inspired crystals

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In the course of biomineralization, organisms produce a large variety of functional biogenic crystals that exhibit fascinating mechanical, optical, magnetic and other characteristics. More specifically, when living organisms grow crystals they can effectively control polymorph selection as well as the crystal morphology, shape, and even atomic structure. Materials existing in nature have extraordinary and specific functions, yet the materials employed in nature are quite different from those engineers would select.

Utilizing high-resolution characterization techniques I will show that biogenic and bio-inspired crystals are very different than their synthetic and geological counterparts even at the level of the crystal structure and microstructure. Moreover, I will show how these structural distinctions can be utilized to produce man made synthetic materials with tailored functional properties.