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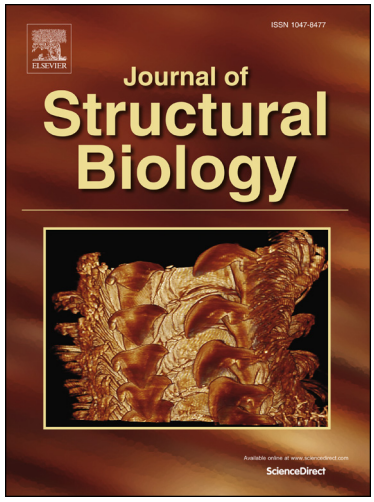

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Lattice Distortions in Coccolith Calcite Crystals Originate from Occlusion of Biomacromolecules

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ABSTRACT

During biomineralization, organisms control the formation and morphology of a mineral using biomacromolecules. The biomacromolecules that most strongly interact with the growing crystals frequently get occluded within. Such an observation has been recently obtained for the calcium carbonate producing coccolithophore species *Pleurochrysis carterae*. Coccolithophores are unicellular algae that produce calcified scales built from complex-shaped calcite crystals, termed coccoliths. It is unclear how widespread the phenomenon of biomacromolecular occlusion within calcite crystals is in calcifying haptophytes such as coccolithophores. Here, the coccoliths of biological replicates of the bloom forming *Emiliania huxleyi* are compared with that of *Pleurochrysis carterae*, two species with different coccolith morphologies and crystal growth mechanisms. From high-resolution synchrotron X-ray diffraction, changes in the lattice