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Synchrotron-FTIRs studies of microbially-mediated biomineral formation

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Abstract

Biomineral formation is a key process to understand the linkage between biological activity and sedimentary structures in the biosphere. Microbial systems have mediated the precipitation of carbonates in natural waters as early as $\sim 3,500$ Ma ago (Krumbein 1983); and still today they are key participants in the formation of massive carbonate constructions in natural waters. Microscale has been a relevant challenge to understand biomineral formation. This research has been invigorated recently by using advanced imaging technologies, such as Synchrotron based-Fourier Transform Infrared spectromicroscopy (SR-FTIRs). This is a non-labelled, non-destructive, spatially resolved strategy that allows chemical characterizations of live cells with microscale resolution. SR-FTIRs revealed structural and functional features of microbial-only biomineral forming systems (microbialites) but also of host-microbiota systems (coralline algae). These first results provide insight into the characteristics of the microsites of mineral formation, and are useful to inspire bio-cement development and carbon sequestration technologies in an increasing CO₂ world.

About

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