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Growth and dissolution kinetics at the dolomite-water interface: An in-situ scanning probe microscopy study

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ABSTRACT

Dissolution and epitaxial growth on dolomite [CaMg(CO₃)₂] cleavage surfaces under well-defined aqueous solution conditions were studied in real-time by atomic force microscopy (AFM). Step-retreat speeds in undersaturated solutions were used to predict the growth speed for ordered dolomite utilizing a theoretical step-growth model. Monolayer growth on dolomite under highly supersaturated conditions was observed, but multilayer growth was inhibited due to film disorder enhanced solubility. Ordered dolomite film growth is predicted in supersaturated solutions close to equilibrium, but observed step speeds were immeasurably low under the current laboratory low-temperature conditions.