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Rheological Characterization of Bioinspired Mineralization in Hydrogels ABIGAIL REGITSKY, NIELS HOLTEN-ANDERSEN, Massachusetts Institute of Technology — With increasing amounts of CO_2 in the atmosphere linked to potentially catastrophic climate change, it is critical that we find methods to permanently sequester and store CO_2. Inspired by the natural biomineralization of calcium carbonate ($CaCO_3$), one future goal of this project is to understand the mechanisms of $CaCO_3$ mineralization in order to ultimately optimize a bioinspired hydrogel system, which produces high value industrial powders that consume CO_2 as a feedstock. Along the way, we are developing a rheological technique to study mineral nucleation and growth events by measuring the modulations in mechanical properties of a hydrogel system during mineralization. Our initial system consists of a gelatin hydrogel matrix, which is preloaded with calcium ions, and an aqueous solution of carbonate ions, which are allowed to diffuse through the gel to initiate the mineralization process. In order to monitor how the growth of minerals affects the mechanical properties of the gel network, we measure the storage (G) and loss (G) moduli of the system in situ. Future work will focus on modifying the properties of the minerals formed by changing the polymer used in the hydrogel network and adding other organic molecules into the system.

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