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Mechanisms for Geological Carbon Sequestration

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Carbon sequestration is believed to be the most direct carbon management strategy for long-term removal of CO₂ from the atmosphere, and is likely to be needed for continuation of the fossil fuel-based economy and high standard of living. Sequestration of carbon dioxide in geologic formations is the immediate, low-cost sequestration option. Carbon dioxide is sequestered in the geologic formations through 1). hydrodynamic trapping as a supercritical fluid under a low permeability caprock, 2). solubility trapping as being dissolved in a liquid such as water and oil, and 3). mineral trapping as dissolved CO₂ reacting with organic matters or minerals to form new minerals. Geologic carbon sequestration involves a large number of processes such as fluid flow, geochemistry, geomechanics, and thermodynamics. The processes are spanned at vastly different temporal and spatial scales and nonlinearly coupled. It poses significant challenges to study these mechanisms and processes.

Keywords: Carbon sequestration;Mechanisms;Nonlinear coupling;