Phlogopite, a clay mineral, interacts with supercritical CO_2 saturated brine

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EFRC: Nanoscale Control of Geologic CO_2

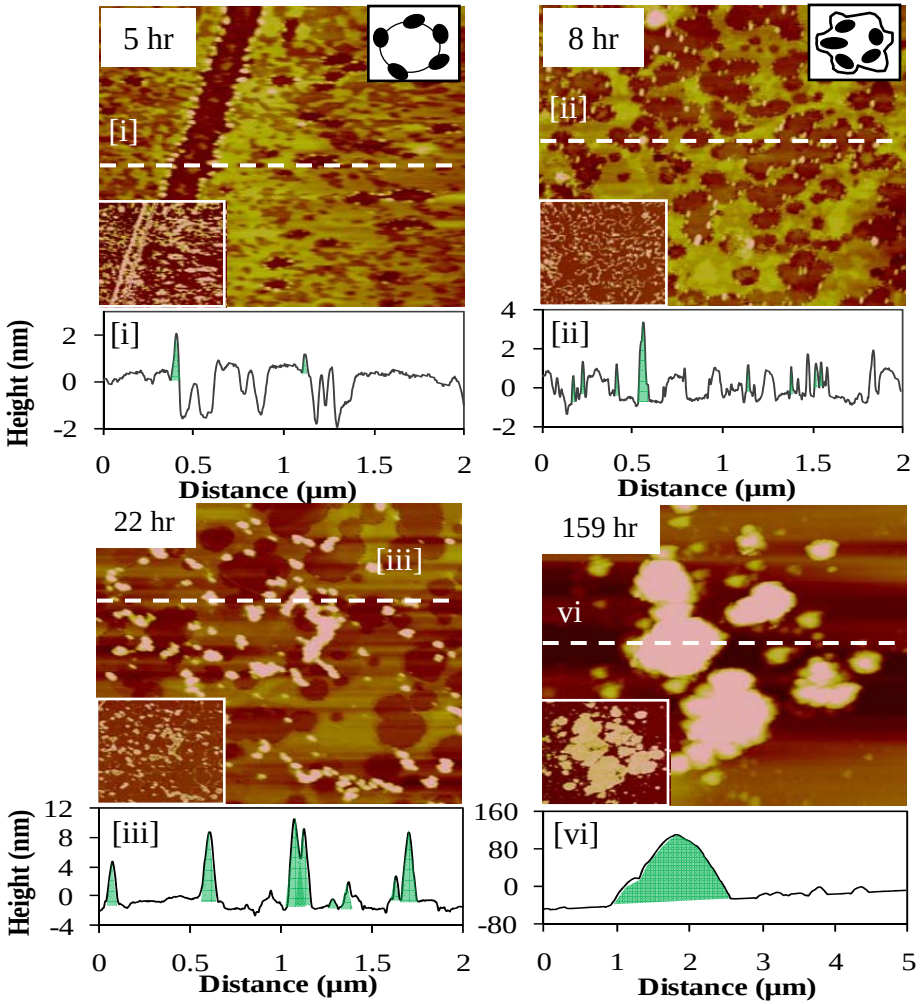

Figure 3. Evolution of nanoscale precipitation on phlogopite surfaces after reaction with CO_2 in 1 M NaCl under 102 atm of CO_2 and 368 K. Insets are AFM phase mode.

- Nanoscale secondary mineral phases formed after only a few hours after CO_2 injection (*in situ* pH ≈ 3.08 ± 0.05).
- Amorphous silica and kaolinite were identified as the secondary mineral phases, and qualitative and quantitative analysis of morphological changes due to phlogopite dissolution and secondary mineral precipitation are presented.
- Nanoparticles first appeared on the edges of dissolution pits and then relocated to other areas as particles aggregated.
- These nanoparticles may grow in the pore throats throughout the clay layers, or they leave the surface and are transported with the fluid along the porous formation rocks, they may significantly decrease the permeability, and consequently hinder the transport of CO_2.

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