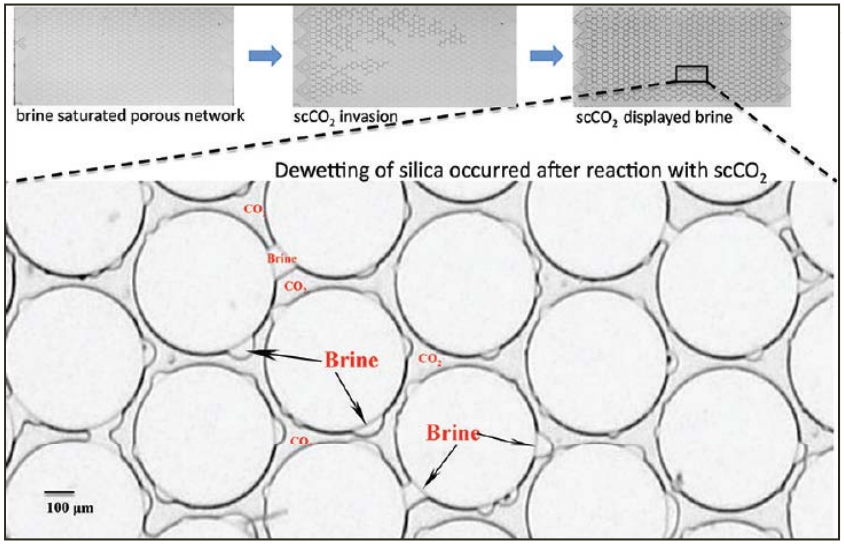
Dewetting of Silica Surfaces upon Reactions with Supercritical CO_2 and Brine

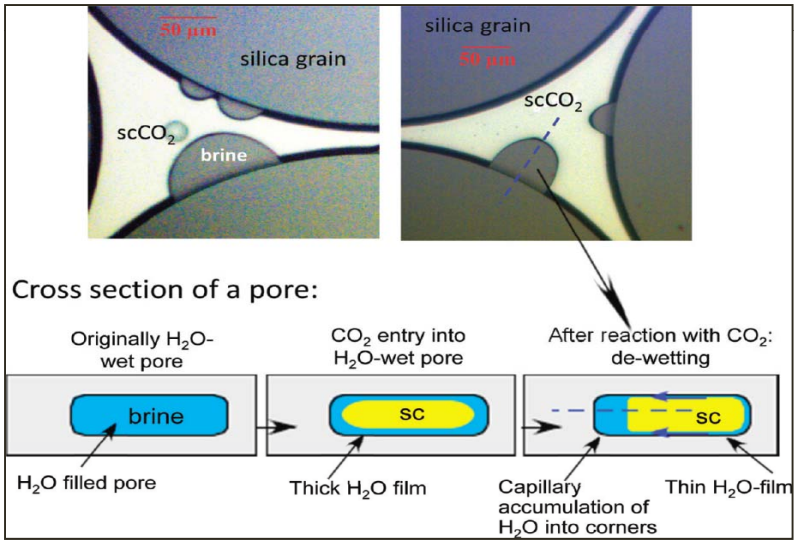
- Wettability of reservoir minerals and rocks is a critical factor controlling CO_2 mobility, residual trapping and safe-storage in geologic carbon sequestration, and currently is the factor imparting the greatest uncertainty in predicting capillary behavior in porous media.

- We studied pore-scale wettability alteration in $scCO_2$−silica-brine systems using engineered high pressure and temperature micromodels under the reservoir relevant conditions.

- For the first time, the dewetting process of silica surfaces (water film thinning, water droplet formation, and water contact angle increase) upon reactions with $scCO_2$ was observed at pore scale. The contact angles increased from near 0° to 80° with larger increases under higher ionic strength conditions.



Dewetting of silica surfaces occurred upon reaction with scCO2, shown by formation of water-droplets and increased contact angles.



Upon reactions with scCO2, water film is thinning and water accumulates in the corners, where the interfacial area is minimized.

Yongman Kim, Jiamin Wan, Timothy J. Kneafsey, and Tetsu K. Tokunaga, *Environ. Sci. Technol.*, **2012**, 46(7), 4228-4235.