

Stable CO₂ foam for leakage risk reduction

Scientific Achievement

Shown experimentally that nanoparticle-stabilized foams generate stable dispersions of CO₂ analog fluid in high-salinity brine. These foams offer a large-scale generation of CO₂ dispersion in brine.

Significance and Impact

Reduce the risk of leakage and increase the efficiency of CO₂ storage with use of nanoparticle-stabilized foams.

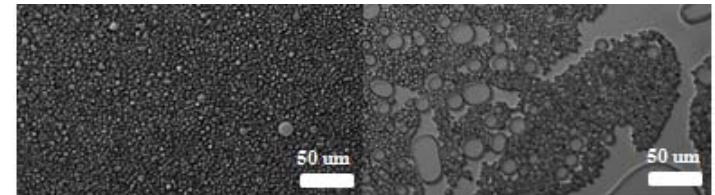
Publications

- Aminzadeh, B., D. H. Chung, S. L. Bryant, C. Huh, and D. A. DiCarlo (2013), CO₂ leakage prevention by introducing engineered nanoparticles to the in-situ brine, *Energy Procedia*, 37, 5290 – 5297.
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- Ingram, D. R., C. Kotsmar, K. Y. Yoon, S. Shao, C. Huh, S. L. Bryant, T. E. Milner, and K. P. Johnston (2010), Superparamagnetic nanoclusters coated with oleic acid bilayers for stabilization of emulsions of water and oil at low concentration, *Journal of Colloid and Interface Science*, 351(1), 225-232.
- Yoon, K. Y. et al. (2012), Effect of Adsorbed Amphiphilic Copolymers on the Interfacial Activity of Superparamagnetic Nanoclusters and the Emulsification of Oil in Water, *Macromolecules*, 45(12), 5157-5166.
- Yoon, K. Y. et al. (2013), Graphene oxide nanoplatelet dispersions in concentrated NaCl and stabilization of oil/water emulsions, *Journal of Colloid and Interface Science*, 403, 1-6.
- Yoon, K. Y. et al. (2011), Stabilization of Superparamagnetic Iron Oxide Nanoclusters in Concentrated Brine with Cross-Linked Polymer Shells, *Langmuir*, 27(17), 10962-10969.
- Worthen, A. J. et al. (2013), Nanoparticle-stabilized carbon dioxide-in-water foams with fine texture, *Journal of Colloid and Interface Science*, 391, 142-151.

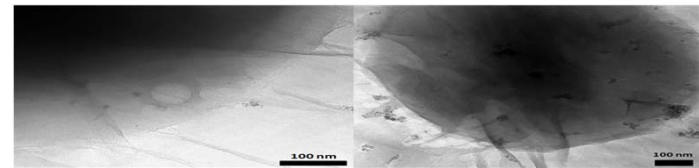
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Optical micrographs of oil/water emulsions: (L) immediately after generation with 0.01 wt% graphene oxide nanoplatelets; (R) 24 hours later



TEM images of graphene oxide nanoplatelet at interface of oil/water emulsion



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