Stable CO_2 foam for leakage risk reduction

Scientific Achievement

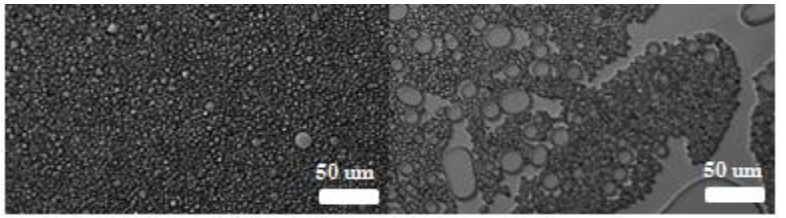
Shown experimentally that graphene oxide (with low mass but large surface area) generates stable dispersions of CO_2 analog fluid in high-salinity brine.

Significance and Impact

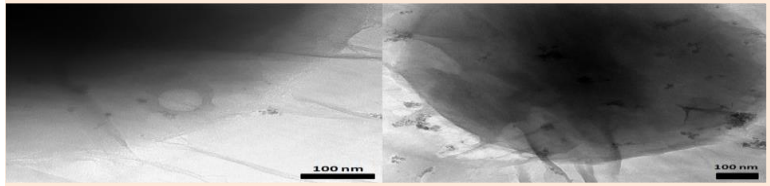
Monolayer platelets of graphene oxide adsorb at fluid/fluid interface easily, serving as highly effective amphiphile, thereby offering potential for large-scale generation of CO_2 dispersion in brine. This can reduce the risk of leakage and increase the efficiency of CO_2 storage.

Research Details

- Aqueous dispersions of graphene oxide nanoplatelets (GONP) shows exceptional stability for range of salinity (0-5 *wt*% NaCl) and *p*H (2-10), largely due to small van der Waals attraction
- Even 0.001 *wt*% of GONP generate stable emulsions, suggesting that it adsorbs at fluid/fluid interface in plane, with large surface area per mass providing good interfacial stability



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 nanopalatelet at interface of oil/water emulsion

K.Y. Yoon, S.J. An, Y. Chen, J.H. Lee, S.L. Bryant, R.S. Ruoff, C. Huh, and K.P. Johnston, "Graphene oxide nanoplatelet dispersions in concentrated NaCl and stabilization of oil/water emulsions," J. Colloid & Interface Science, *accepted* (2013).