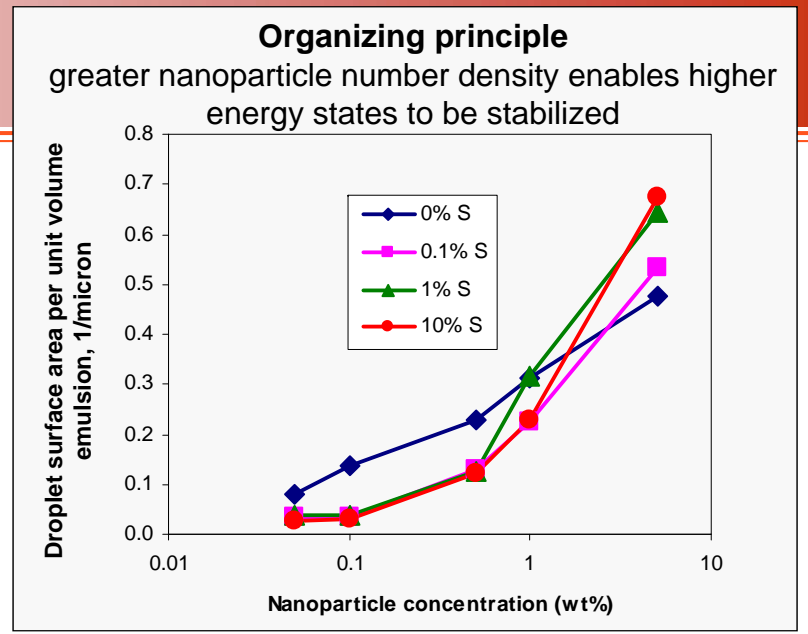
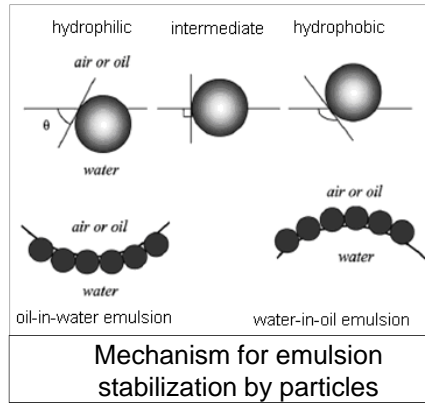
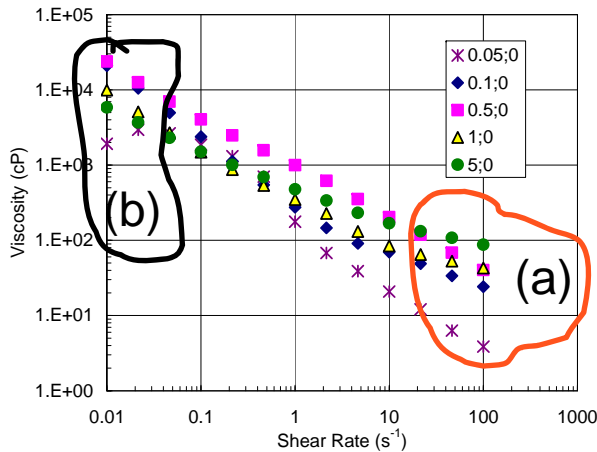


Stabilizing emulsions with surface-coated nanoparticles

Steven Bryant, The University of Texas at Austin

MOTIVATION: Surface coated nanoparticles are an attractive means of stabilizing emulsions for a variety of reservoir engineering and well construction applications.

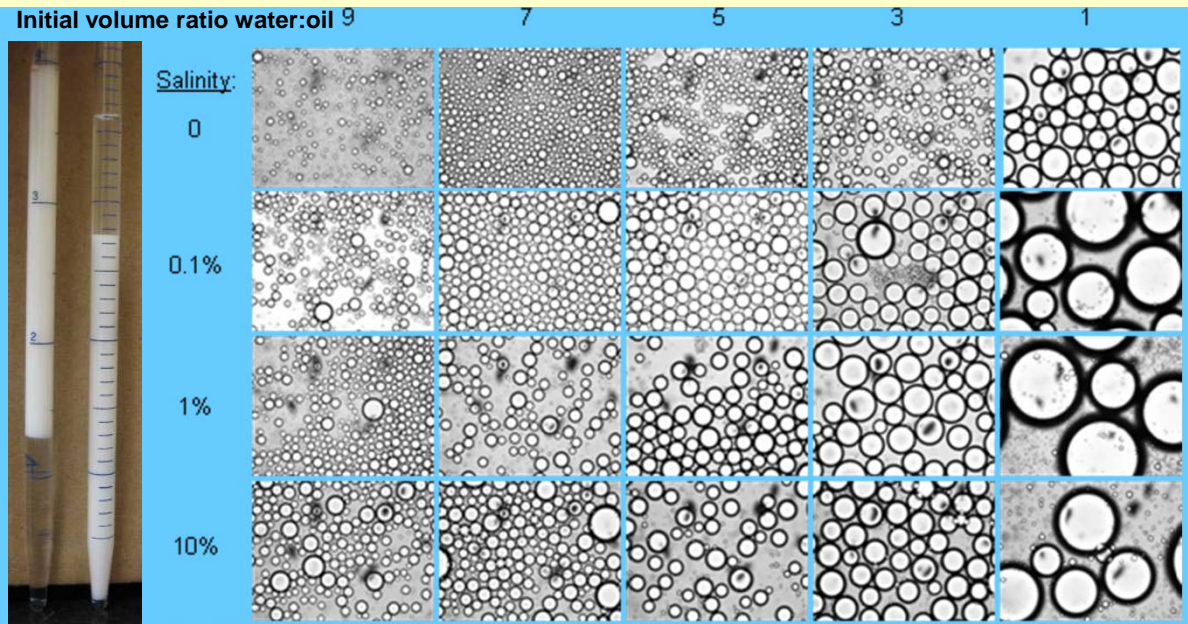


Our emulsions are strongly shear-thinning. This enables new application: place emulsion where desired by injecting at large rate (a), then stopping flow. Subsequent flow will be diverted around the extremely viscous stationary emulsion (b)

METHOD:

- batch experiments in a four-component system (hydrocarbon phase (toluene or decane), water, NaCl, nanoparticles)
- emulsions generated with a wide range of salinities (0 to 10 wt%) and nanoparticle concentrations (5 nm silica cores with various coatings ranging from hydrophilic polyethylene glycol to hydrophobic; 0.05 wt% to 5 wt%).

Remarkably small concentrations of nanoparticles needed: 500 ppm!



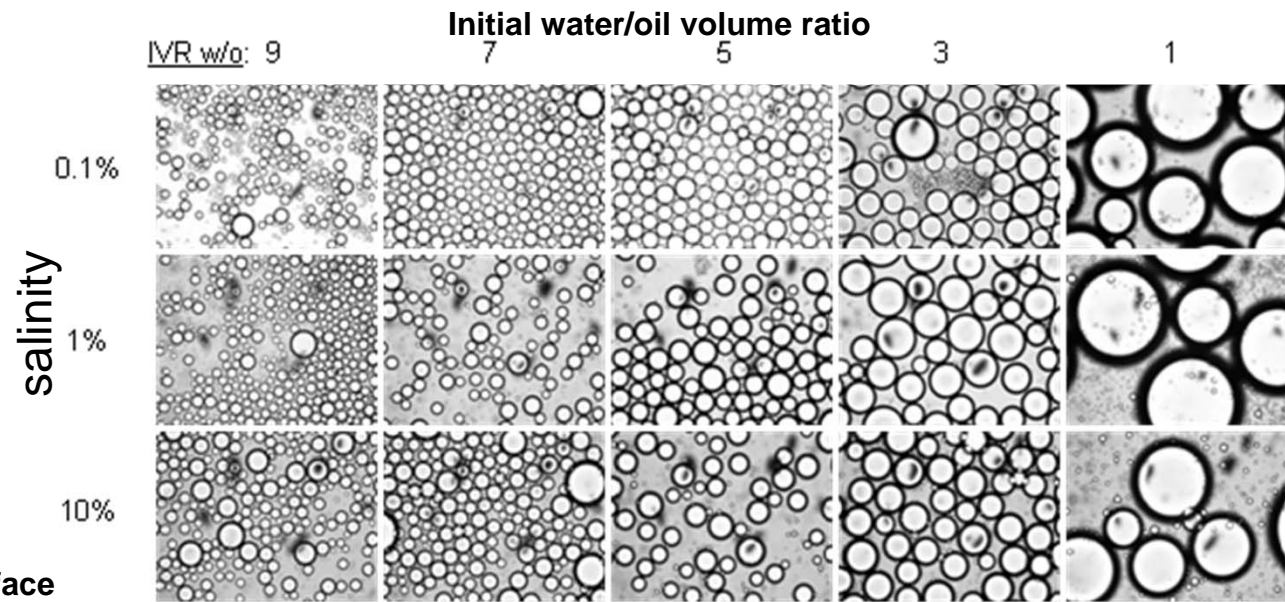
emulsions stabilized with surface coated nanoparticles (L) oil-in-water; (R) water-in-oil

Oil droplets in emulsions stabilized with 0.05 wt% nanoparticles

50µm



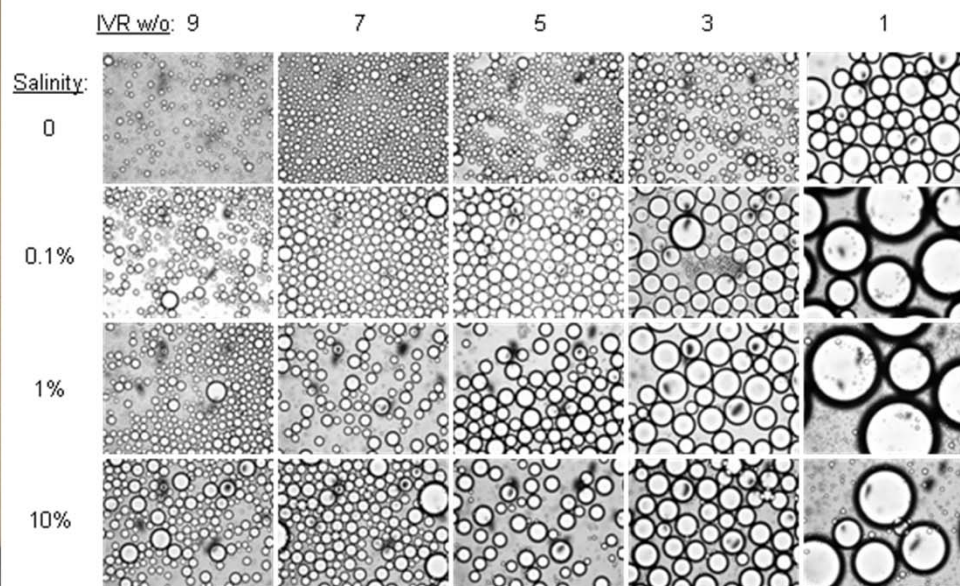
emulsions stabilized with surface coated nanoparticles (L) oil-in-water; (R) water-in-oil



Oil droplets in emulsions stabilized with 0.05 wt% nanoparticles $50\mu\text{m}$



emulsions stabilized with surface coated nanoparticles (L) oil-in-water; (R) water-in-oil



Oil droplets in emulsions stabilized with 0.05 wt% nanoparticles

50µm
H