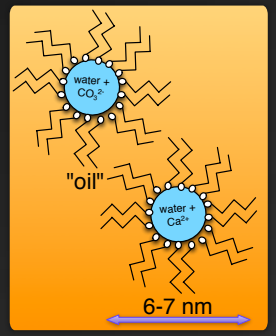
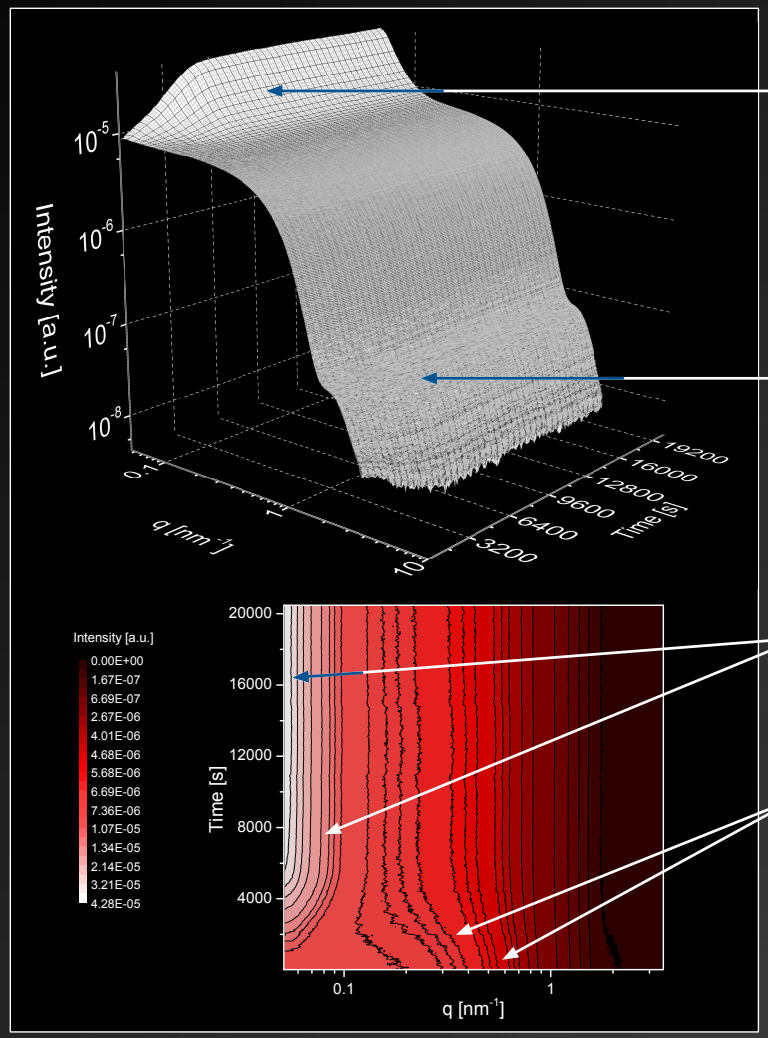
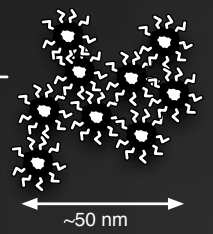
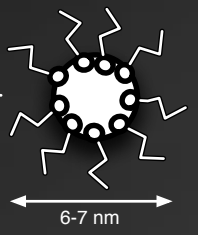
Reverse microemulsions are thermodynamically stable suspensions of water droplets in oil i.e. micelles that are stabilized by an interface surfactant. Water droplets are typically 1-50 nm in diameters. They can carry dissolved salt ions and exchange their content upon collisions, which lead to mineral precipitation. These droplets are believed to act as "nano-reactors" because precipitation occurs in the water pools shielded by the surfactants from the oil phase. We used this approach to follow the nucleation and growth of $CaCO_3$ by mixing two distinct microemulsions containing Ca^{2+} and CO_3^{2-} ions. The as-precipitated primary particles of $CaCO_3$ had a diameter of 6-7 nm, while the $CaCO_3$ agglomerates had 100-200 nm .



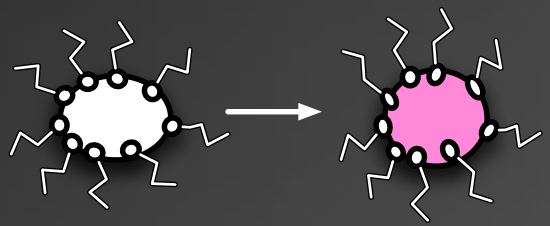






Agglomeration. Concerns only a small fraction of particles

Possible change of shape, electron density and/or polydispersity



Precipitation of calcium carbonate amorphous nanoparticles in microemulsions followed by in situ and time-resolved small angle X-ray scattering. Two scattering contributions are clearly visible: (1) scattering from individual micelles at high-q and (2) scattering from agglomerates at low-q.