Precipitation of CaCO3 in microemulsions

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Mineral Scale Formation
From the nano ... ... to the field scale
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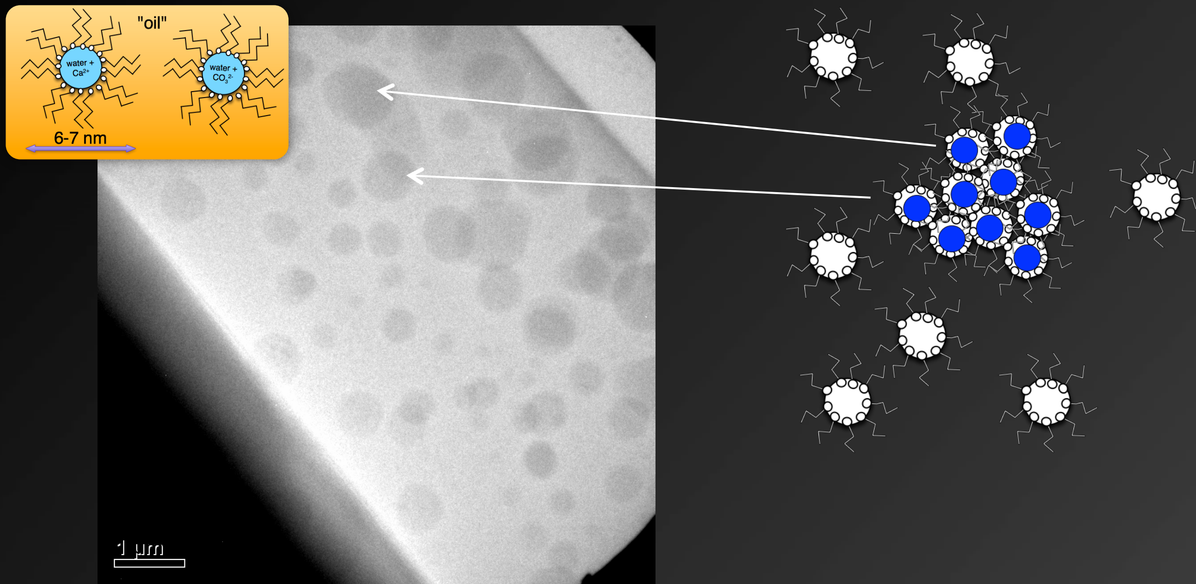
Liquid-cell *in situ* TEM results:



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. We used this approach to follow the nucleation and growth of CaCO3 by mixing two distinct microemulsions containing Ca2+ and CO32-ions. The as-precipitated primary particles of CaCO3 had a diameter of 6-7 nm, while the CaCO3 agglomerates were 1000-2000 nm. The in situ scattering in conjunction with liquid-cell TEM results suggested that upon destabilization of the mass-fractal-like structures, a transformation from initially stable micelle-sized structural units to larger particles took place.