

Simulating the Spontaneous Emulsification of Oil/Water/Surfactant Mixtures

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Goals:

Understanding the fundamental mechanisms in spontaneous emulsification, exploring the growth laws of internal interfaces in the forming microemulsion.

Computer Simulation Method:

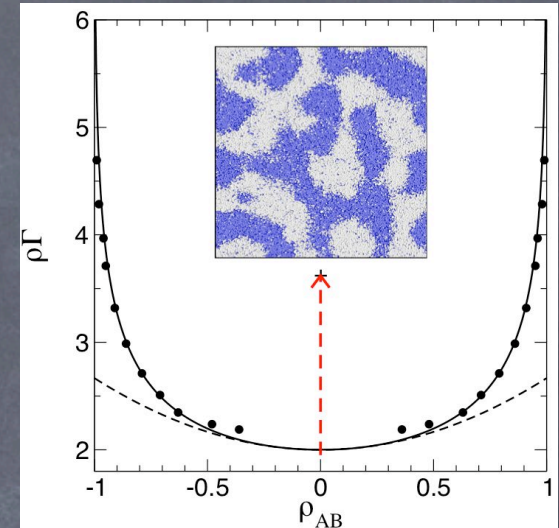
A mesoscale, particle-based method called Multi-Particle Collision Dynamics with explicit surfactant, consistent thermal fluctuations and hydrodynamics.

E. Tuzel et al, *Europhys. Lett.* 80 (2007) 40010.

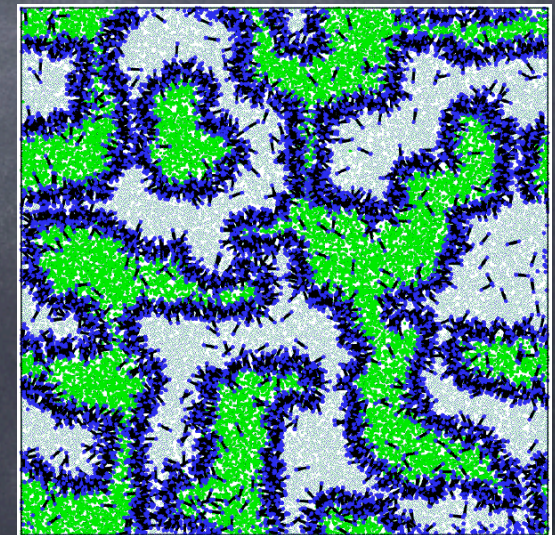
Results:

Exact derivation of mean field phase diagram, transport coefficients, and the gradient terms in the Ginzburg-Landau free energy functional for the algorithm without surfactants by means of kinetic theory.

T. Ihle, *J. Phys: Cond. Matter* 20 (2008) 235224.



Binary phase diagram



Snapshot of a fluctuating microemulsion in equilibrium