

## Associative Nanoemulsions Fabricated by Interfacial Assembly of Amphiphilic Block Copolymers

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This talk introduces an extremely stable attractive nanoscale emulsion fluid, in which the amphiphilic block copolymer, poly(ethylene oxide)-block-poly( $\epsilon$ -caprolactone) (PEO-b-PCL), is tightly packed with lecithin, thereby forming a mechanically robust thin film at the oil-water interface. The molecular association of PEO-b-PCL with lecithin is systematically confirmed by  $T_2$  relaxation and DSC analyses. Moreover, suspension rheology studies also reflect the interdroplet attractions over a wide volume fraction range of the dispersed oil phase; this results in a percolated network of stable drops that exhibit no signs of coalescence or phase separation. This unique rheological behavior is attributed to the dipolar interaction between the phosphorylcholine groups of lecithin and the methoxy end groups of PEO-b-PCL. Finally, the nanoemulsion system significantly enhances transdermal delivery efficiency due to its favorable attraction to the skin, as well as high diffusivity of the nanoscale emulsion drops. Our findings support the potential use of our attractive nanoemulsion system over a wide range of applications in drug delivery, cosmetic and food formulations, and life sciences.