Tailored Lamellar Structures for Highly Stable Thermoresponsive High Internal Phase Emulsions

Taissa Moreira da Silva Lima and Watson Loh

Institute of Chemistry, State University of Campinas (UNICAMP), Campinas, SP, Brazil

wloh@unicamp.br

This contribution will describe a protocol for emulsion preparation that renders highly stable concentrated emulsions at lower temperatures, that may be de-stabilized above a certain transition temperature.
This methodology relies on the deposition of lamellar phases, prepared with a few wt.% of ionic surfactants such as CTAB and stearate, and fatty alcohols, at the oil-water interface, whose thermotropic behavior account for the observed changes in stability. Their mesophases were characterized by SAXS/WAXS analyses confirming the transition from gel to liquid crystalline (Lb to La) lamellae upon heating. The temperature of transition could be determined by DSC and interfacial tension measurements and is shown to be dependent of the surfactant and alcohol used, as well as on their ratio. The high stability of emulsions at lower temperature allows their concentration up to 85% dispersed phase, providing an interesting alternative to preparation of high stability HIPEs (high-internal phase emulsions).
This transition range could be tuned from below room to above body temperature, rendering a versatile protocol to produce temperature responsive emulsions. These could be envisaged for applications in personal care formulations, as irreversible temperature indicators among others.

Keywords:
emulsions, HIPEs, lamellar phases

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