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Stabilization of Oil-in-oil Emulsions by bis-lipophilic copolymers

Emulsion is a mixture of two or more immiscible liquids in which one is present as droplets. Non-aqueous emulsions have gained attention in recent years due to their ability to avoid reactivity with water. In particular, polymeric oil/oil (O/O) emulsions have potential applications in drug delivery, controlled release, encapsulation, self-healing systems, polymerization, energy storage, and electro-optical devices. Unlike conventional oil/water (O/W) emulsions, polymeric O/O emulsions have similar polarity, resulting in a significantly smaller interfacial tension at the interface. This means that molecular amphiphiles smaller than a few nanometers cannot stabilize the O/O interface. Furthermore, the immiscibility of the two liquids in O/O emulsions arises from polymer incompatibility, whereas below the binodal it forms a homogeneous solution. In this project, I will construct two immiscible phases using two incompatible polymers mixed in a common organic solvent, which will be stabilized above the binodal using a block copolymer consisting of both polymers. Then the di-block copolymer at different compositions will be characterized and its effect on the stabilization of the O/O emulsion will be investigated by observing through confocal microscopy, LUMireader, and light scattering.

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