

Gelled Bicontinuous Microemulsions – A Novel Type of Orthogonal Self-Assembled Systems –

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While most high-viscous microemulsions described in literature contain polymeric gelators like gelatin or amphiphilic block co-polymers [1-4] we reported that adding an appropriate low molecular weight gelator also leads to gelled microemulsions [5-7]. In these gelled microemulsions the nano-structured microemulsion and the gelator network coexist independently without substantially altering each other's properties and are thus a novel type of *orthogonal self-assembled* systems [8]. We demonstrate the coexistence of two different supramolecular structures by measuring phase diagrams, rheological properties and SANS curves of the model system H₂O – *n*-decane / 12-hydroxyoctadecanoic acid (12-HOA) – tetraethylene glycol monodecyl ether (C₁₀E₄). The study was carried out at three different gelator concentrations, namely at 1.5 wt.%, 2.5 wt.% and 5.0 wt.% of the low molecular weight organogelator 12-HOA [9]. We found the typical microemulsion phase boundaries in the gelled system, albeit, for each gelator concentration, about 6 K below the phase boundaries of the non-gelled “base” microemulsion H₂O – *n*-decane – C₁₀E₄. Moreover, we detected by DSC and rheological measurements a sol-gel boundary of the gelled microemulsion which lies about 20 K below that of the respective binary gel *n*-decane / 12-HOA. Nevertheless, the general phase behaviour of both base systems is maintained in the gelled microemulsion. Secondly, the rheological experiments also attest that the gelled microemulsion and the binary gel *n*-decane / 12-HOA possess very similar properties. Finally, the SANS curves reveal that the curves of the gelled microemulsions are indeed a superposition of the curves obtained for the binary gel and the non-gelled microemulsion, respectively.

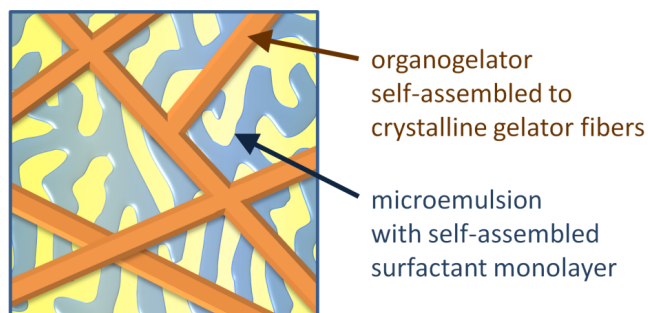


Figure 1. Schematic drawing of a bicontinuous microemulsion gelled by a low molecular weight organo-gelator which is an *orthogonal self-assembled* system.

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