Thermo-responsive Janus emulsions

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Emulsions with compartmentalized droplet structures, prepared through moderate energy vibrational route, have recently attracted reinforced research interests due to their promising applications. Janus emulsions, comprising droplets of two distinct subregions of immiscible components, are explored for wide range of fields including detection of bacteria to templated synthesis anisotropic particles [1-3].

In this contribution, thermo-responsive Janus emulsions between olive oil and silicone oil were produced through vibrational emulsification. An amphiphilic copolymer of 2-(meth-acryloyloxy)ethyl oleate (MAEO) and N,N-diethylacrylamide (DEAA) was synthesized to employ as stabilizer for Janus emulsions. Temperature dependent behaviour of the copolymer was analysed by dynamic light scattering and cryo-scanning electron microscopy (cryo-SEM). 'Completely engulfed', long-term stable emulsion droplets were formed below the volume-phase transition temperature (~32°C) of the emulsifier. Temperature-triggered 'instantaneous' breakdown of the Janus droplets was achieved by raising the emulsion temperature to 35 °C. This phenomenon can be explained by temperature-induced collapse of the copolymer on the droplet surface followed by desorption of the polymer. Temperature-responsive compartmentalized structures are promising for applications in bio-catalysis.

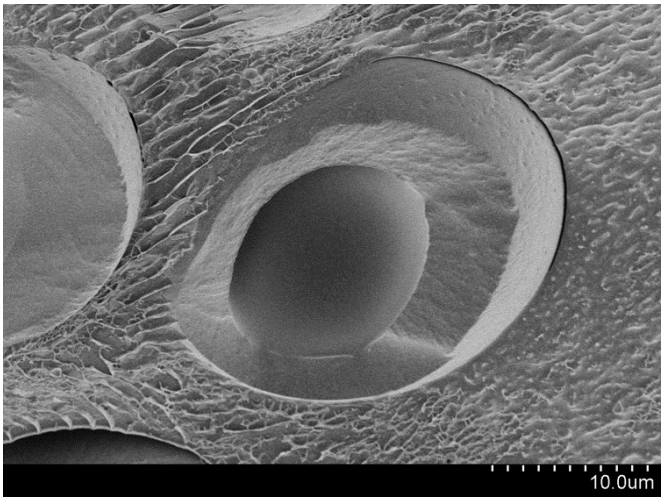

Figure 1. Cryo-SEM of Janus droplet stabilized by thermo-responsive copolymer

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[3] L Ge, S Lu, J Han and R Guo, *Chem. Commun.* **51** (2015), 7432–7434.