Supramolecular colloids as emulsion stabilizers

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Pickering emulsions are emulsion stabilized by particles instead of surfactants. Due to the high attachment energy of the particles at the droplet interface, Pickering emulsions offer a higher stability compared to the conventional surfactant-stabilized emulsions, especially in terms of droplet coalescence. The fact that particles are used as stabilizers offers an extra advantage, interesting properties can be added to the system by using functional particles. The aim of this study is to form Pickering emulsions using supramolecular colloids as stabilizers. Such supramolecular colloids consist of silica colloids functionalized with a benzene-1,3,5-tricarboxamide (BTA) derivative. Such BTA molecules recognize and selectively interact with identical BTAs through 3-fold intermolecular hydrogen bonds [1]. In addition, the BTA was equipped with a photo-cleavable group to block the formation of the hydrogen-bonds when present. Studies on the behaviour of these colloids in cyclohexane showed that prior to irradiation, BTA-colloids remain as singlets. Upon cleavage of the protective group by light, colloids cluster as the short-range hydrogen-bonding interactions between anchored molecules are activated [2]. To use these colloids as emulsion stabilizers, firstly, their hydrophobicity was tuned to obtain the appropriate contact angle to be able to stabilize water-in-cyclohexane emulsions. Secondly, formulation studies were carried out changing the amount of particles as well as the water/cyclohexane ratio to obtain stable Pickering emulsions. Finally, the behaviour of the supramolecular Pickering emulsions upon irradiation was studied by means of confocal microscopy.

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