

Licensing Opportunity

Raspberry particles as universal particle emulsifiers

Summary

Raspberry-like microparticles facilitate the formulation of a broad range of emulsions. The same material can be used to stabilize both oil-in-water (o/w) and water-in-oil (w/o) Pickering emulsions.

Background

Pickering emulsions are emulsions solely stabilized by the adsorption of solid particles onto the droplet surface and find vast applications in the food, pharma, chemical, oil and mining industries. Up to now, (o/w) and (w/o) Pickering emulsions are stabilized using two different kinds of particles, hydrophilic and hydrophobic ones. This implies that a specific emulsifier type has to be designed to stabilize a specific type of emulsion. This often presents practical problems related to the free and independent choice of materials applicable to a broad range of end uses.

Invention

Raspberry-like microparticles (see Fig. 1) entirely made of silica have demonstrated to stabilize (o/w) as well as (w/o) emulsions. In order for the same object to stabilize both emulsion types, they have to display two essential features: a sufficient roughness and a wettability close to neutrality. As a consequence of their rough surfaces, the particles exhibit a large contact angle hysteresis, namely they acquire a very different contact angle depending on which phase they are dispersed in (see Fig. 2). The invention comprises the fabrication of raspberry-like particles and the functionalization of their surface.

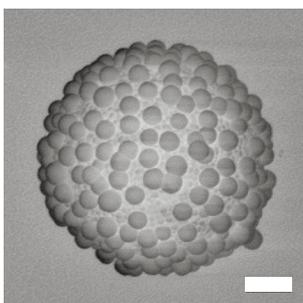


Fig. 1 SEM micrograph of a raspberry-like particle. The scale bar is 200 nm.

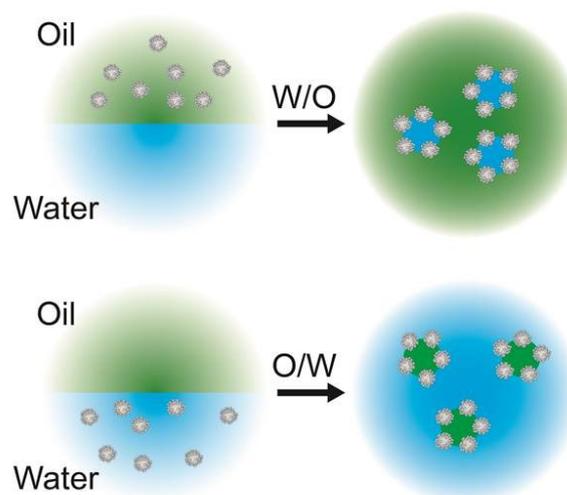


Fig. 2 (top) The particle emulsifier is first dispersed in oil. When water is added the particles keep a large contact angle with the oil, thus stabilizing water droplets in oil. (bottom) The situation is reversed when the particles are first dispersed in water. The effect is due to the large contact angle hysteresis stemming from surface roughness and contact line pinning.

Features & Benefits

- One particle emulsifier for both (o/w) and (w/o) emulsions
- Additive-free emulsion stabilization
- Tailored wettability by surface roughness

Fields of Application

- Micro-encapsulation
- Stabilization of emulsions and foams
- Fabrication of nanostructured materials

Patent Status

- Patent pending

Publication

- M. Zanini et al., Nature Communications, 8, 15701, DOI: 10.1038/ncomms15701 (published 7 Jun 2017)

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Reference: 2016-097
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