**Double emulsions with inner interface stabilized with hydrophobic silica nanoparticles**

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Double emulsions (W1/O/W2) are multicompartmentalized systems conformed by a primary emulsion (W1/O) emulsified with an external aqueous phase (W2), allowing the encapsulation of bioactive compounds in both W1 and O phases. The inner W1:O interface is generally stabilized with polyglycerol polyricinoleate (PRPG), which allows obtaining fine emulsions, but unstable in time. Pickering emulsions is one of the strategies studied to prolong the stability of emulsions, which involves the emulsification with solid particles that create a physical barrier between phases. Silica nanoparticles are one of the particles used to stabilize O/W emulsions. However, these nanoparticles must be chemically modified to increase their hydrophobicity by linking a hydrophobic molecule such as fatty acids. The aim of this work was to obtain W1/O/W2 with W1/O nanoparticle-stabilized Pickering emulsions, using surface-functionalized silica nanoparticles with myristic acid (SiO2/C14-NPs) as emulsifier. The contact angle and particle size of SiO2/C14-NPs were 123.7 ± 0.2° and 222.6 ± 9.5 nm, respectively. Droplets size of nanoparticle-stabilized Pickering W1/O emulsions at day 14 was 13.6 ± 1.4 µm (2% w/w) and 10.0 ± 0.4 µm (4% w/w); whereas smaller droplet sizes (< 3 µm) were obtained with 2% and 4% of PGPR, leading to a lower percentage of water droplets sedimentation in control emulsions. However, SiO2/C14-NPs stabilized W/O emulsions did not show water separation after 14 days of storage, whereas PGPR-stabilized emulsions showed 20% (2% w/w) and 9.5% (4% w/w) of water separation. W1/O/W2 with the typical multicompartmentalized structure were obtained using W1/O emulsions stabilized with SiO2/C14-NPs (4% w/w), sodium caseinate as emulsifier for the O:W2 interface and pectin as thickener in W2. These W1/O/W2 showed a bimodal droplet size distribution, with D4,3 values of 9.1 ± 0.1 µm at day 0, that increased until 11.9 ± 0.1 µm after 14 days of storage at 4 ºC. Despite the larger droplet size of W1/O emulsions obtained with SiO2/C14-NPs, these emulsions showed better long-term stability to water separation than PGPR-stabilized emulsions, since the nanoparticles adsorb at the interface, providing a physical barrier that prevents contact between droplets. Furthermore, stable W1/O/W2 were obtained by the Pickering stabilization of the W1:O interface.

Palabras Clave: Pickering emulsion, myristic acid, solid particles