Temperature-induced structural transitions of cationic vesicle dispersions

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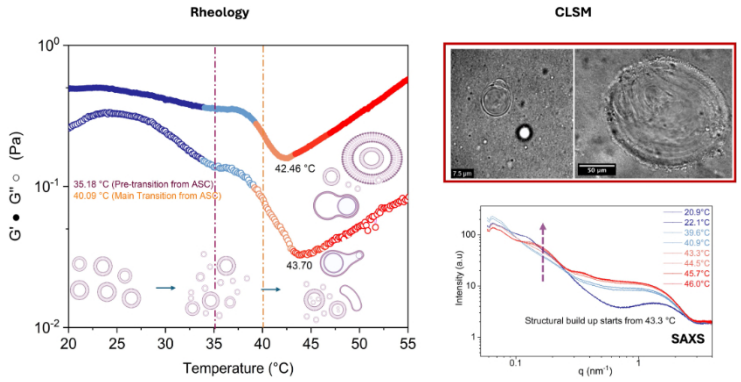
Double tailed cationic surfactants are common ingredients for laundry, when dispersed in water they can form dispersion of small unilamellar vesicles (200 nm to 1 mm) and they can be formulated with other additives as cross linked cationic polymers (microgel) and perfumes in oily phase. The macroscopic properties of this complex fluid, such as its rheology, are closely linked to its microstructure. In particular, understanding the temperature-dependent behaviour of the cationic vesicles and its altering interaction mechanism with the additives, i.e., perfumes and microgels, is critical for controlling rheology, microstructure and stability over ageing. In this research, we explore the structural transitions of the cationic vesicles with increasing temperature. The observed change in vesicle shape and lamellarity are linked to the counterion type [1], and bilayer phase transitions, heterogeneities and fluidity [2,3], and allows to identify some intermediate shapes such as docking, pear and onion-like. We use rheology, confocal microscopy and scattering (WAXS, SAXS) to connect the nano-to-macro structural changes to macroscopic properties, and to correlate alterations of the bilayer fluidity with the diffusion behaviour of the additives. Combined, our results provide a novel mechanistic description linking colloidal to macroscopic lenghtscales that can improve formulation.

Keywords:
Vesicles, bilayer, microstructure, phase transitions, temperature



Thermo-rheology, confocal microscopy, Small Angle X-Ray Scattering (SAXS) at different temperatures display structural build up in cationic vesicles

References:

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