

Layer-by-Layer capsules for fragrance encapsulation

Toward the mechanical tuning of their membrane

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Abstract:

The purpose of the project is to develop innovative fragrance core-shell microcapsules to protect the perfume molecules from environment and to control the fragrance release. Our approach is to adsorb successively hydrogen bonds interacting polymers on the oil droplets of a primary emulsion by a Layer-By-Layer (LBL) process. Successful encapsulation of droplets of both dodecane (as model oil) and perfume was achieved and characterized by optical microscopy, cryo-SEM and granulometry. The mechanical properties of the polymer multilayers have been investigated directly on liquid interfaces with two complementary interfacial rheology techniques: dilation/compression on a single drop and shear on a planar interface. We showed that we can finely tune the mechanical behavior of the multilayers (shear and compression resistance, buckling...) by creating either fluid or solid interfaces using various polymer types (polyvinylpyrrolidone coupled with various poly(meth)acrylic acids with different hydrophobicity). Overall, the results obtained at droplet (macroscopic) and membrane (mesoscopic) scales allowed us to suggest molecular mechanisms of chain deformation within the layer under constraint.