

Experiment n. SC 2168

Investigation of polysaccharide-lecithin self assembling nanocapsules

Experimental report

Chitosan-lecithin self assembling nanocapsules have been prepared in different polysaccharide-lecithin mole ratios. Commercial lecithin has been used in order to test the structure of nanovehicles that can be directly employed for drug delivery purposes. Collected data have been treated with standard procedures for raw data reduction and background and solvent subtraction.

Due to the complexity of the system, different techniques have been used in parallel. X-ray scattering results have been compared to neutron scattering, light scattering and cryo-tem results, to access the structure of the nanoparticles on different lengthscales. Different polycation-lipid mole ratios give rise to complex structures that could display different performances in terms of extent of drug solubilization. Multilayer structures are formed, with repeat units composed by lipid bilayers covered by polysaccharide. Small angle scattering results were fitted to an expression accounting for the form factor of a bilayer with non-uniform contrast profile, the structure factor of a multilayered structure with variable number of repeat units, polydispersity.

The following table collects some structural results about nanoparticles with different chitosan-lecithin mole ratios, as determined from SAXS measurements. g_n is the number fraction of i -th population with n layers.

	NCL80	NCL20	NCL5
$tlip$ (Å)	12.92 ± 0.03	12.88 ± 0.02	12.56 ± 0.01
$thead$ (Å)	8.79 ± 0.03	8.73 ± 0.02	9.20 ± 0.01
ρ	0.336 ± 0.001	0.348 ± 0.001	0.360 ± 0.001
$g1+g2$ (N = 1, 2)	0.74 ± 0.01	0.56 ± 0.01	0.84 ± 0.01
$g3$ (N = 3)	0.2 ± 0.01	0.38 ± 0.01	0.13 ± 0.01
$g4$ (N > 3)	0.07 ± 0.01	0.06 ± 0.01	0.03 ± 0.02