

[C3. O. Sandre] Smart hybrid magnetic polymersomes

Novel magnetic nano-composites are obtained by the self-assembly in water of polypeptide-based diblock copolymers polybutadiene-*b*-poly(glutamic acid) combined with either hydrophilic or hydrophobic γ -Fe₂O₃ nanoparticles. These hybrid supramolecular objects are either filled micelles (3-d) or hollow vesicles with a magnetic membrane (2-d). At first, we have used isotropic SANS (PACE spectrometer) to explore the different types of objects formed and prove the formation of closed magnetic membranes (before their visualization by AFM and TEM); the membrane thickness has been calculated using Kratky-Porod plots. [1] Then, the deformation of such polymersomes with a magnetic membrane has been studied as a function of an applied magnetic field intensity by anisotropic SANS on the PAXY spectrometer. Here again, the use of SANS was of great importance to determine the anisotropic deformation of the membrane quantitatively. [2] These magnetic colloids are also able to respond to stimuli such as pH and ionic strength due to the presence of the polypeptide block, forming thus “multi-responsive” nanocapsules. These superparamagnetic hybrid self-assemblies offer attractive potentialities in biomedicine of staying for some time in the blood, due to their dimensions (100-500 nm), of manipulation by an external magnetic field, of local heating by a radio-frequency field for cancer radio-therapy, and of contrast enhancement in Magnetic Resonance Imaging. *Collaboration* : . O. Sandre - R. Perzynski, LI2C Paris 6, F. Chécot- S. Lecommandoux LCPO Bordeaux.

[1]- (a) Lecommandoux, S., Sandre, O., Chécot, F., Perzynski, R. Progress in Solid State Chemistry 34, 2006, p 171. (b) Lecommandoux, S., Sandre, O., Chécot, F., Rodriguez-Hernandez, J., Perzynski, R. Journal of Magnetism and Magnetic Materials 300, 2006, p 71.

[2]- Lecommandoux, S., Sandre, O., Chécot, F., Rodriguez-Hernandez, J., Perzynski, R. Advanced Materials 17, 2005, p 712.

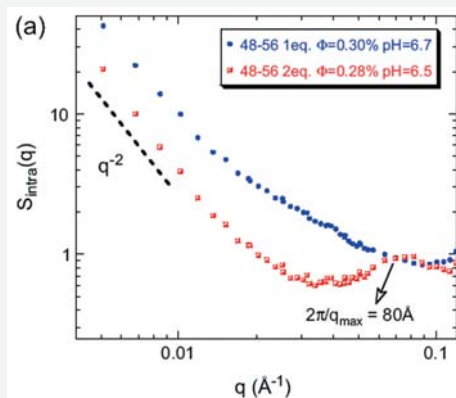


Figure 1 (a) Intra-aggregates' structure factor $S_{\text{intra}}(q)$ for hydrophobic nanoparticles associated to PB₄₈-*b*-PGA₅₆, as measured by SANS. (b) Deformation of hollow magnetic shells of the same polymersomes proven by the anisotropy of the 2D SANS patterns under a magnetic field (oriented horizontally) of variable intensity, and its schematic representation.

