Characterization of Polyelectrolyte Hollow Microcapsules in water by X-Ray Microscopy

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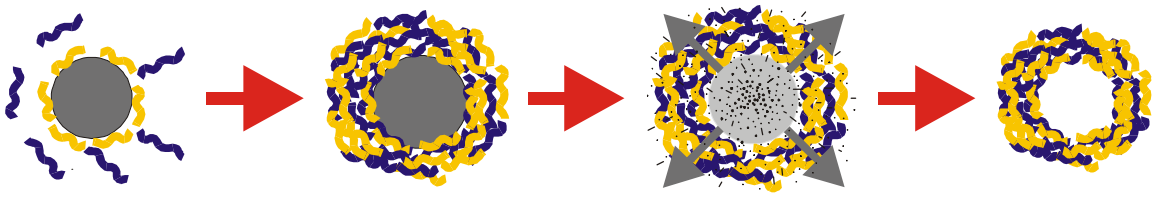
Polyelectrolyte hollow microcapsules have received great interest recently due to their unique properties and the fine-tuning of their shell thickness in the nanometric scale. They are prepared by the alternative deposition of oppositely charged polyélectrolytes (Layer-by-Layer technique) on colloidal particles and subsequent dissolution of the sacrificial template [1]:



These capsules are well characterized in dry state by atomic force microscopy or electronic microscopies, giving sub-micron and nanometric resolution. However in wet state, the resolution is much worse, due to the use of optical microscopes. Here we present the results obtained in water using a X-Ray microscope, allowing a resolution up to 20nm. This powerful technique was used to measure *in situ*, in water suspension, the tickness of capsules made of sodium poly(styrene sulfonate) (PSS) and poly(diallyldimethyl ammonium) chloride (PDADMAC), whose size and shell thickness were tuned by changing the temperature.

[1] E. Donath, G. B. Sukhorukov, F. Caruso, S. A. Davis, H. Möhwald, *Angew. Chem. Int. Ed.* **1998**, *37*, 2201.