Self-assembly in solution of silica-based hybrid materials: Contribution of *in-situ* SAXS studies

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Surfactant templated mesoporous silica powders have been extensively studied in the past 15 years by exploiting the self-assembly properties of amphiphilic molecules in aqueous medium. The large success of these systems mainly relies on the apparent simplicity that enables to design porous networks with different architectures and pore sizes. However, a better control of the final nanostructure (2D-hexagonal, 3D-cubic) requires a deeper understanding of the interaction mechanisms between the templating agents and the network-forming species.

This work will show our latest experiments using *in-situ* Small Angle X-ray Scattering (SAXS) performed with highly brilliant synchrotron radiation to follow the formation mechanism of templated silica powders in the presence of different types of surfactants (non-ionic triblock copolymers, non-ionic fluorinated surfactants, cationic surfactants with different polar head groups) and silica precursors. This type of experiments give access to a lot of information about the cooperative self-assembly of these systems and the nanostructure formation. We will emphasize how the inorganic precursor affects the micelles in solution (prior to, during and after hydrolysis of the precursor) and how the micelles shape is linked to the final nanostructure of the hybrid material.

[1] Manet, S.; Lecchi, A.; Impéror-Clerc, M. ; Zholobenko, V. ; Durand, D. ; Oliveira, C.L. P. ; Pedersen, J.S. ; Grillo, I. ; Meneau, F.; Rochas, C.

Structure of micelles of a non-ionic copolymer determined by SANS and SAXS

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Kinetics of the formation of a 2D-hexagonal silica nano-structured materials by non-ionic copolymer templating in solution

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