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Polyoxometalate-rich complex micelles for functional mesoporous materials

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Poster Abstract

The newly developed Polyion complex (PIC) micelles have unparalleled significance in the construction of functionalized and ordered mesoporous materials. MesoPIC micelles are fabricated through the electrostatic complexation between a charged double hydrophilic block
copolymer (DHBC) and an oppositely charged polyelectrolyte. The formation and deformation of these micelles could be controlled by physico-chemical proceedings such as a pH change, a property of predominant importance in templeting agents employed for the preparation of ordered mesoporous materials. The immense study of PIC micelles has opened a new array of opportunities in front of us. We are currently working on two different protocols, employing the MesoPIC process.

Protocol 1:
In this procedure, functionalised Polyion complex (PIC) micelles, fabricated through the electrostatic complexation between a charged double hydrophilic block copolymer (DHBC) and an oppositely charged polyelectrolyte, functions as structuring agent for the construction of porous materials. Hence, the primary aim of the strategy would be to synthesise DHBCs, with well controlled degree of polymerisation. Secondly, the focus would be the functionalisation of the DHBC synthesised. The functional DHBC envisaged, PEO-b-POMs, will contain a poly(ethyleneoxide) block and a block grafted with polyoxometalates (POMs). POMs are metal anionic nanoclusters with promising properties, especially as catalysts or UV-absorbers. This method will permit the direct formation of porous organised materials, functionalised with POMs at the pore surface.

Protocol 2:
In the giant novel complex micelles (Complex PIC Micelles) developed through this novel means, inorganic clusters exhibiting various structural and functional properties, referred to as Polyoxometalates (POMs), functions as the core and the DHBC builds the periphery. POMs
employed for the initial studies are Pospho- and Silicotungstic acid. Preliminary analysis of the Complex PIC Micelles through DLS/SLS, confirm them to be giant structures, with a radius of approx. 45 nm. SAS would be employed for understanding these micelles in more detail. Knowing the structure and shape of the micelles prepared would be key, for the efficient use of them in order to construct mesoporous materials, with potential application in catalysis and UV-Adsorption.

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