

Ligand-induced self-assembly of polyoxometalates

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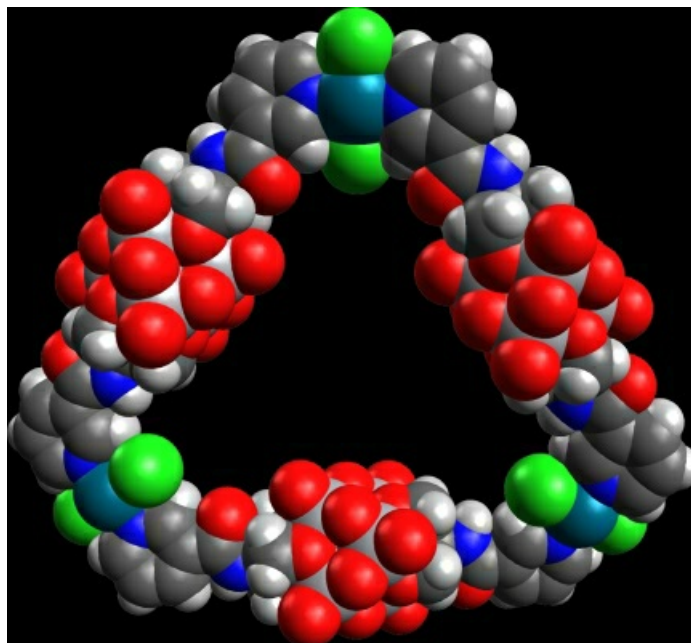
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Supramolecular chemistry has established the concepts for the self-assembly of complex architectures and smart materials. Organic molecules are often determining the outcome of such processes. Therefore, the attachment of polyoxometalates (POMs) to suitable organic molecules yields organic-inorganic hybrids that are useful constituents for the construction of POM-based supramolecular systems.

This presentation focuses on two different approaches: i) the grafting of ligands with free binding sites allows the self-assembly of supramolecular architectures through the coordination of transition metals. The general principle, the hurdles and the final assembly of a trimeric macrocycle will be presented. We have grafted pyridyl, bipyridyl and terpyridyl type ligands on different POM platforms (Anderson, Lindqvist and Dawson-type). The geometric constraints imposed by the coordination vectors of these ligands determine the outcome of metal complexation, such as coordination polymers or discrete species.[1] ii) The grafting of thermoresponsive polymers allows the preparation of smart materials that include POMs. Different synthetic procedures and the characterization of the POM-polymer hybrids will be presented. We grafted poly-diethylacrylamide on a Dawson-type polyoxotungstate. The hybrid compound exhibits thermoresponsive properties in aqueous solution. Above the lower critical solution temperature of 39°C, it forms reversibly aggregates in the range of 100 nm. The properties can be tuned by variation of the polymer length and the counterion. [2]

[1] Santoni, M.-P. et al. (2012) Chem. Commun. 48, 200-202.

[2] Lesage de la Haye, J. et al. (2015) Polymer 57, 173-182.



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