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Host–Guest Binding Hierarchy within Redox- and Luminescence-Responsive Supramolecular Self-Assembly Based on Chalcogenide Clusters and γ-Cyclodextrin


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Invited for the cover of this issue are Anton A. Ivanov, Mohamed Haouas, Stéphane Cordier, Pavel Abramov, Emmanuel Cadot, and co-workers involved within the CLUSPOM-CNRS International Laboratory, including the Nikolaev Institute of Inorganic Chemistry (Novosibirsk, Russia) University of Versailles Saint Quentin and University of Rennes 1 (France). The image has been designed by Mrs. Alice Gronier (UVSQ) from an original idea of Dr. Pavel Abramov (NIIC). The cover picture depicts redox and luminescent octahedral clusters $[Re_6Q_8(CN)_6]^{4-}$ that interact through supramolecular host–guest process, with biocompatible macrocycles such as γ-cyclodextrin. Read the full text of the article at 10.1002/chem.201802102.

What is the most significant result of this study?

Manipulation of rhenium-containing octahedral clusters in aqueous solution revealed their high propensity to interact with γ-cyclodextrin to give close host–guest supramolecular assemblies. Solution studies revealed that the chaotropic character of these ions could be the main driving force that favors formation of supramolecular assemblies. Moreover, we want to emphasize that encapsulation process gives rise to significant alterations of the intrinsic physical–chemical properties of the cluster core, such as decreasing of the redox potential and luminescence enhancement. Then, we anticipated that such an approach should be suitable for developing advanced multifunctional materials relevant in redox photocatalysis or biomedical applications.

What other topics are you working on at the moment?

The International Associated Laboratory CLUSPOM-CNRS is also active in polyoxometalates chemistry, aiming to develop supramolecular systems containing functional units, hierarchically organized through highly specific recognition pathways. We are also invested in inorganic synthesis with the goal to design new water soluble and hydrolytically stable metal clusters potentially interesting for their intrinsic properties, such as chemical, redox behavior, luminescence and robustness.