

Engineering photoactive architectures: lights, camera, action!

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Photoactive transition metal complexes (TMCs) are currently attracting enormous interest due to their outstanding photophysical properties and rich redox features. These compounds have found valuable application in several fields, including photocatalysis, bio-imaging, medicinal chemistry, light harvesting devices and optoelectronics. During the first part of the talk, novel classes of phosphorescent emitters based on *N*-heterocyclic carbene (NHC) ligands will be presented and their optical properties investigated by joint photophysical and theoretical approaches.^[1]

The possibility to precisely control nano- and micrometer scale architectures with long-range order that are based on functional TMCs still represents a challenge. Also, self-assembly through weak non-covalent interactions has been shown to provide a way to organize molecules in supramolecular structures with properties superior to common bulk materials. In the second part, a class of square-planar platinum(II) complexes featuring metallophilic interactions will be presented. Their self-assembly capability have been employed for unraveling evolution of complex biomimetic assembly processes *in* and *out* of the thermodynamic equilibrium in real-time.^[2]

Finally, smart functional materials that are able to translate an externally applied stimulus into a well defined, controllable, and reversible macroscopic response are one of the most fascinating classes of materials nowadays.^[3] In this framework, we have employed reversible metal-ligand coordination bonds for preparing dynamic, photoswitchable, metallopolymeric materials able to form self-healable gels that display mechanical actuation at the macroscopic scale^[4]. On the other hand, the monitoring of the reversible photo-triggered expansion/contraction processes at the sub-molecular level at the liquid-solid interface was achieved by means of scanning tunneling microscopy (STM)^[5], where these systems reversibly played as supramolecular “accordions” under orthogonal light irradiation.

References

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