Photo(redox)active and photo(electro)switchable materials

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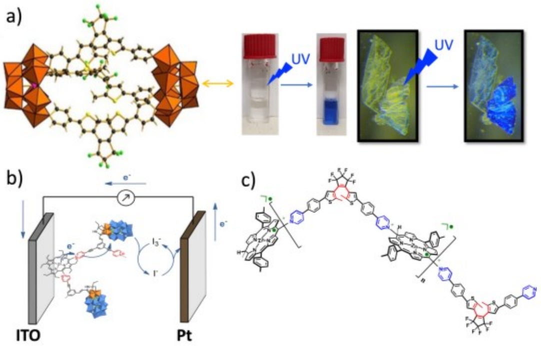

Fig. 1 Various type of photo(redox)-active or photo(electro)switchable systems studied.

The seminar will be divided into two parts. The first part will be on the development of hybrid systems incorporating polyoxometalates (POMs) which is a promising approach to elaborate new redox active materials. To expand the practical applications, their association to a visible-light photosensitizer is needed and has been explored (Fig. 1). In this context, we have also developed a method of electropolymerization of POMs based on nucleophilic attack onto the electrogenerated porphyrin radical cation or dications. The formation of hybrid POM-porphyrin copolymeric films (Fig. 1b) can be obtained by the electro-oxidation of porphyrin in the presence of the hybrid POM bearing two pyridyl groups (Py-POM-Py).[1-2] Using the same methodology, the synthesis of a diarylethene-(iso)porphyrin photoswitchable copolymer has been developed (Fig. 1c). The incorporated diarylethene maintains its reversible photochromism upon the UV-Vis radiation with multiple cycles of ring-opening and closing.[3] A photo-switchable molecular capsule based on Keggin-type POM and diarylethene has been also formed and studied (Fig. 1a).[4]

In the second part, other photoredox-switchable materials will be described. For instance, molecular grippers based on resorcin[4]arene cavitand platforms equipped with alternating quinone (Q) and quinoxaline walls carrying hydrogen bond donating groups will be presented. The semiquinones (SQ) state can be generated electrochemically and photochemically.[5] It was shown that these systems adopt an open conformation in the oxidized Q state until redox interconversion to the paramagnetic SQ radical anion provides the stabilization of the closed form through hydrogen bonding.

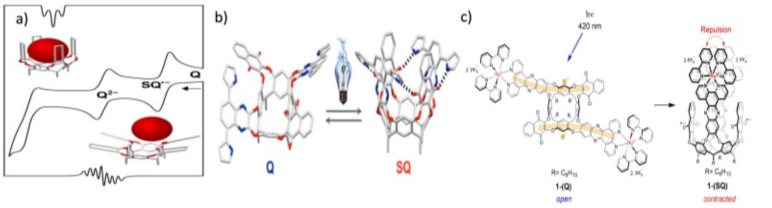

Fig. 2 Photoredox-switchable molecular grippers based on resorcin[4]arene cavitand platforms.

References

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