VIOLAINE GOUDY

will present her Ph.D. dissertation

Synthesis, characterization and reactivity of polymetallic compounds for photochemistry and charge-transfer

The defense will take place on Tuesday, November 24, 2015 at 2.00 pm
in the ICSM Auditorium

This work falls within the global project of the light energy conversion and storage. These systems require the association of several molecular constituents as a photosensitizer coupled to a catalyst. In order to improve the fundamental understanding on photo-induced charge transfer, the photo-physical behavior of molecular species was compared to their coordination polymers analogs. The first step of this work was to develop a synthetic pathway leading to bimetallic molecular species through an organic bridging ligand and to their coordination polymers analogs. The electro-chemical and photo-chemical studies of molecular species incorporating one or two photosensitizing units highlight the essential parameters for a photo-induced charge transfer. The effect of the nature and structure of the complexes and the ligands (ancillary ligands and bridging ligands) on physico-chemical properties was studied. Complexation of cobalt induces a significant drop of the excited state lifetime assigned to an electronic communication between the two metallic centers. Incorporation of electro-donating substituents on the ancillary ligands linked to the photosensitizer unit leads to a better electron transfer to the second metal center. Then the study was focused on the coordination polymer (PC) analogs. Two kinds of PC were synthesized, a first one incorporating only photosensitizing units as nodes, the catalyst being coordinated to the organic ligand, a second one with photosensitizing and catalytic units as nodes. These amorphous materials were synthesized and their photo-physical properties were studied. Finally the first attempts for the photo reduction of CO$_2$ and protons were realized on molecular species and coordination polymers.

Keywords: Synthesis; Characterization; Photochemistry; Electrochemistry; Coordination polymers; Molecular materials