UCLouvain
Institute of Condensed Matter and Nanosciences

IMCN

Prof. Ludovic TROIAN-GAUTIER

IMCN – Pôle MOST

IMCN SEMINAR

" Making the Most of Photons: Controlling Excited-State Reactivity Towards More Efficient Energy Conversion "

Monday 21 November 2022 – 11:00 am
Auditorium CARNOY
Croix du Sud, 4, 1348 Louvain-La-Neuve

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ABSTRACT

Solar energy represents a promising renewable energy source. In natural and artificial photosynthesis, light absorption and catalysis are separate processes linked together by exergonic electron transfer. This leads to free energy loss between the initial excited state, formed after light absorption, and the catalytic center formed after the electron transfer cascade. Additional deleterious processes, such as internal conversion and vibrational relaxation, can also initially dissipate as much as 20-30 % of the absorbed photon energy.

Two main research topics will be presented. The first one deals with the development of strategies that minimize these energy losses processes. In binuclear complexes, a novel strategy allowed to trap a higher energy excited state, before internal conversion and vibrational relaxation, saving between 110 and 170 meV and leads *in fine* to 140 meV more potent reductant for catalysis. This approach represents a novel strategy on how excess energy can be harnessed in bimolecular electron transfer reactions, to generate more potent reductants useful for energy conversion schemes and solar fuels production.

The second project is related to mechanistic photoredox catalysis. There is a plethora of organic transformations that can be sensitized to visible light, but the corresponding reaction mechanisms are not always straightforward. Here, we will present recent advances in the field of mechanistic photoredox catalysis by means of steady-state and time-resolved spectroscopies using a series of organic and inorganic photosensitizers.

BIOGRAPHY

I received my Ph.D. in chemistry (2014) from the Université libre de Bruxelles. I then worked at a spin-off focusing on surface modification using calix[4]arene derivatives. Between 2015 and 2019, I performed research within the Alliance for Molecular PhotoElectrode Design for Solar Fuels directed by Prof. G. J. Meyer at UNC-Chapel Hill. In May 2019, I started a Chargé de Recherches position (FNRS) at ULB and, in October 2021, I moved to the Université Catholique de Louvain where, in October 2022, I was promoted to Chercheur Qualifié F.R.S.-FNRS to pursue my research endeavor on energy related challenges