Electron-Triggered Metamorphism in Self-Assembled Metal-Organic architectures

Christophe Bucher

Laboratoire de Chimie UMR 5182 CNRS- ENS de Lyon. Christophe.bucher@ens-lyon.fr

Stimuli-responsive self-assembled molecular materials are currently subject to intense research activity. This growing interest stems largely from the myriad of exciting applications envisioned for dynamic supramolecular assemblies in materials science, sensing, catalysis and electronics. Enormous technologic interests are for instance at stake in being able to devise molecular objects that could respond to external stimuli by changes in structure and function. These particular properties can lead to applications in various domains as (i) in molecular electronics, (ii) in analytic science, with switchable hosts allowing the controlled binding/release of pollutants or drugs, (iii) in materials science with the development of adaptive supramolecular polymers.

Our group has been focusing over the past few years on the development of tailor-made redox-controllable molecular or supramolecular systems involving electrogenerated organic π-radicals as key responsive and/or assembling elements [1, 2]. In this lecture, we will focus on the physico-chemical properties of a series of responsive metal complexes whose assembly or function can be controlled with an electrical stimulus. Particular attention will be given to molecular systems exhibiting electron-switchable magnetic properties. The properties of these redox-responsive molecular architectures and molecular materials will mainly be discussed on the basis of electrochemical, spectroelectrochemical and ESR experiments supported by quantum chemical calculations [3-8].

References

[1] C. Kahlfuss, E. Saint-Aman, C. Bucher (2016). Redox-controlled intramolecular motions triggered by π-dimerization and πmerization processes In T. Nishinaga (Ed.), *Organic Redox Systems: Synthesis, Properties, and Applications* (pp. 39). New-York: John Wiley and sons.

[2] H. D. Correia, S. Chowdhury, A. P. Ramos, L. Guy, G. J.-F. Demets, C. Bucher, *Polymer International* **68**, 572 (2019).

[3] S. Chowdhury, Y. Nassar, L. Guy, D. Frath, F. Chevallier, E. Dumont, A. P. Ramos, G. J.-F. Demets, C. Bucher, *Electrochimica Acta* **316**, 79 (2019).

[4] C. Kahlfuss, S. Denis-Quanquin, N. Calin, E. Dumont, M. Garavelli, G. Royal, S. Cobo, E. Saint-Aman, C. Bucher, *Journal of the American Chemical Society* **138**, 15234−15242 (2016).

[5] C. Kahlfuss, T. Gibaud, S. Denis-Quanquin, S. Chowdhury, G. Royal, F. Chevallier, E. Saint-Aman, C. Bucher, *Chemistry - A European Journal* **24**, 13009 (2018).

[6] C. Kahlfuss, R. Gruber, E. Dumont, G. Royal, F. Chevallier, E. Saint-Aman, C. Bucher, *Chemistry - A European Journal* **25**, 1573 (2019).

[7] C. Kahlfuss, S. Chowdhury, A. F. Carreira, R. Grüber, E. Dumont, D. Frath, F. Chevallier, A. Eric Saint, C. Bucher, *Inorganic Chemistry*, **60**, 3543-3555 (2021).

[8] S. Chowdhury, Q. Reynard-Feytis, C. Roizard, D. Frath, F. Chevallier, C. Bucher, T. Gibaud, The *Journal of Physical Chemistry B*, **125**, 12063-12071 (2021).