

## Electrochemical O<sub>2</sub> activation by Fe and Mn porphyrins. Towards electrocatalytic aerobic oxidations of organic substrates

E. Anxolabéhère-Mallart,<sup>a\*</sup> C. Fave<sup>a</sup> N. Kostopoulos,<sup>a</sup> F. Banse<sup>b</sup>

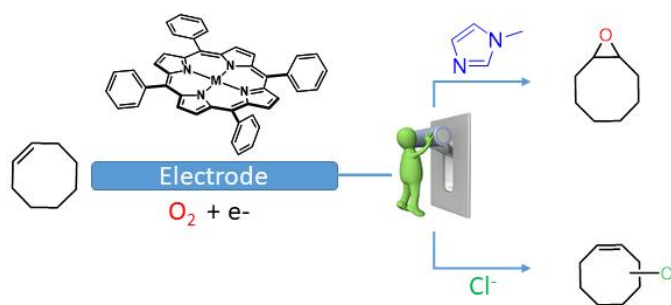
<sup>a</sup> Université Paris Cité, Laboratoire d'Electrochimie Moléculaire UMR 7591, CNRS, F-75013 Paris, France

<sup>b</sup> Université Paris-Saclay, Institut de Chimie Moléculaire et des Matériaux d'Orsay UMR 8182, CNRS, F-91405, Orsay, France

[elodie.anxolabehere@u-paris.fr](mailto:elodie.anxolabehere@u-paris.fr)

The development of efficient, selective and non-noble metal based catalysts allowing the use of O<sub>2</sub> under mild conditions instead of harmful oxidants or energy costly methods is a crucial issue in the oxidation of organic molecules.<sup>1</sup> In this context, taking inspiration from Nature, we aim at reproducing activities of metalloenzymes of the oxygenase/halogenase family which are able to perform oxidation/halogenation reactions efficiently and selectively under mild conditions, through the reductive activation of O<sub>2</sub>.<sup>2</sup> Our original strategy focuses on complementary electrochemical and spectroscopic approaches to study the activation of O<sub>2</sub> by Fe and Mn porphyrins in order to ultimately develop electrosynthetic processes for the oxygenation or halogenation of a series of substrates under homogeneous conditions.<sup>3,4</sup>

We will illustrate our work with recent studies of O<sub>2</sub> reductive activation using Mn or Fe complexes using cyclic voltammetry and spectroelectrochemistry and present promising results of electrocatalysis experiments towards oxidation of substrates.<sup>5</sup>



<sup>1</sup> F. Cavani, J.H. Teles *ChemSusChem* **2009**, 2, 508-534.

<sup>2</sup> X. Huang, J.T. Groves *Chem. Rev.* **2018**, 118, 2491-2553.

<sup>3</sup> N. Kostopoulos, C. Achabou, J.-M ;Noël, F. Kanoufi, M. Robert, C. Fave *Inorg. Chem.* **2020**, **59**, 11577-11583

<sup>4</sup> E. Anxolabéhère-Mallart, F. Banse *Current Opinion in Electrochemistry* **2019**, 15, 118-124.

<sup>5</sup> N. Kostopoulos, F. Banse, C. Fave, E. Anxolabéhère-Mallart, *Chem Commun* **2021**, 57, 1198-1201.