pH-D Offer

Bio-inspired metal complexes for biomass valorization.

Project

Lignocellulosic biomass in plant cell walls (PCW) constitutes one of the largest global sinks of photosynthetically fixed carbon and is increasingly considered as a natural and renewable resource for the production of biofuels, biochemicals and biomaterials.[1] Nevertheless, biomass valorisation is still a challenge and the natural resistance of PCW components (*e.g.* lignin, cellulose and hemicellulose) to deconstruction, known as "biomass recalcitrance", is largely responsible for the high cost of lignocellulose conversion. In Nature, many organisms including fungi and bacteria are able to degrade lignocellulosic biomass. These organisms produce various enzymes (oxidative and hydrolytic) which are secreted and act in a synergistic manner.

Among oxidative components, Lytic polysaccharide monooxygenases (LPMOs) are recently discovered copper-containing enzymes that play a major role in recalcitrant polysaccharides deconstruction (e.g. cellulose) *via* oxidative mechanisms.[2] We are interested since several years in understanding LPMOs structure-function relationships and mechanism,[3,4] and we have recently described the first bioinspired low molecular-weight catalyst inspired from LPMOs.[5,6] Taking inspiration from the main characteristics of copper-containing LPMOs we aim at developing biomimetic metal complexes for the oxidation of recalcitrant polysaccharides for biofuel or biomaterial applications. The project will rely on an **interdisciplinary** combination of techniques ranging from coordination chemistry, spectroscopy, catalysis and biotechnology.

Keywords:

biomimetism, bioinorganic chemistry, catalysis, green chemistry, polysaccharides

To apply:

The candidate should have a master's degree in chemistry or biochemistry. To apply, send a CV, a motivation letter, master 1 & master 2 transcripts (at least first semester of M2) and the names of two references.

Funding and contact

The project will be conducted in the BiosCiences team of iSm2 (UMR 7313), a joined laboratory of CNRS/Aix Marseille Université/Centrale Marseille. The project involves a collaboration with the group of Jean-Guy Berrin (DR INRAE at BBF, UMR1163, Aix Marseille Université/INRAE).

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[6] Our preliminary results obtained the **biomimetic innovation** price from the Région Sud in 2019