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**Volume 1**

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# Sommario

## Volume 1

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and Helten<sup>4</sup> attempted the synthesis of B,B',B''-trimesityl-N,N',N''-trimethyl borazine but they could obtain the product only in traces after 14 days.

Keeping in mind these challenges, we developed a new synthetic protocol to access B,B',B''-substituted borazines. In this context greener, easier to handle and more accessible boronic esters are used instead of harmful boron halides. Moreover, by combining the Lewis acid-catalysed protocol with the known advantages of Microwave Assisted Organic Synthesis, we could synthesize a variety of B-substituted borazines in higher yields in 1h while reducing the quantity of waste generated.

#### IND-PO-010. Modulation of redox property of Cu complexes based on bipyridine ligands substitution

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We recently reported on a new application for the [Cu(6,6'-dimethyl-2,2'-bipyridine)<sub>2</sub>][PF<sub>6</sub>] (coded CuBPA) system as an active catalyst for allylic oxidation of cyclohexene by tert-Butyl hydroperoxide (TBHP) in dichloromethane<sup>1</sup>. Such a redox cycle was not observed for [Cu(2,2'-bipyridine)<sub>2</sub>][PF<sub>6</sub>] (coded CuBPD) system where the oxidation by TBHP is a fast but irreversible process, and the back-reduction with cyclohexene is not observed. The slow kinetic of the oxidation of CuBPA by TBHP, in contrast with the almost immediate oxidation of CuBPD, prompted us to explore the system [Cu(6-methyl-2,2'-bipyridine)<sub>2</sub>][PF<sub>6</sub>] (coded CuBPAD), aiming at a complex with intermediate redox and catalytic properties: it is known that the backbone substitution is crucial for the properties of these systems<sup>2</sup>. Preliminary computational study showed an encouraging linear correlation between the grade of methyl substitution and the  $\Delta E$  and  $\Delta G$  of the two oxidation reactions. Thus, we synthesized the BPAD ligand and prepared the corresponding Cu complex. The good match between computed and experimental Raman spectra confirmed the good quality of the models, corroborating the computational result, cyclic voltammetry confirmed the intermediate redox potential of CuBPAD, while UV-Vis study monitored the oxidation for CuBPAD in the same conditions used for CuBPA, confirming an intermediate behaviour that we expect to be reflected in the catalytic performance<sup>3</sup>.

#### ABC-PO-052. Toxins of freshwater microorganisms, from bio- to chemodiversity

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A certain number of cyanobacteria (prokaryotic microorganisms present in all waters) produce toxic secondary metabolites. The massive growth of these cyanobacteria can lead to high concentrations of toxins in the water, thus posing a threat to human health. Cyanobacterial toxins (cyanotoxins) are secondary metabolites with a huge chemical diversity due to the high flexibility of their biosynthetic pathways.

Biosynthetic pathways are common to all toxigenic cyanobacteria, but that the resultant toxic molecules are dependent on the species: *Planktothrix rubescens* and *Microcystis aeruginosa* for instance have the same gene cluster of the hepatotoxic microcystins (MC), but they synthesize different variants of MC. These examples show how an integrated biological and chemical approach can be very effective in studying toxigenic cyanobacteria. This approach has demonstrated to be very useful in addressing the toxic potential of cyanobacteria in different natural lakes.

#### ANA-PO-060. Highly sensitive chemoresistive sensors based on pristine and doped CeO<sub>2</sub> for H<sub>2</sub> detection

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Chemoresistive sensors utilizing metal oxide semiconductors represent one of the most prevalent technologies for gas detection. These sensors are simple and low-cost devices but at the same time capable of rapidly detecting extremely low gas concentrations; on the other hand, they lack sensitivity and need to operate at high temperatures<sup>1</sup>. They are widely employed in various fields such as environmental monitoring, industry safety, and medical diagnostics<sup>2</sup>. In this study, we conducted a comparative analysis of the response exhibited by chemoresistive sensors based on pristine and doped CeO<sub>2</sub> prepared following two distinct fabrication methodologies. The first approach utilized Flame Spray Pyrolysis (FSP), enabling the synthesis and direct deposition of CeO<sub>2</sub> nanoparticles onto interdigitated electrodes (IDEs) through the combustion of liquid precursors in a flame. Additionally, CeO<sub>2</sub> nanoparticles were also synthesised via conventional wet-chemistry and sol-gel processes and deposited onto IDEs via drop-coating and spin-coating. CeO<sub>2</sub> nanoparticles were chemo-physically characterised using XRD, IR, DLS, BET, TGA, UV-Vis and ICP techniques to investigate their composition, dimensions, surface area, thermal stability, and band gap. Subsequently, the sensors were subjected to various gaseous analytes, and their performance was evaluated by comparing the outcomes of the different synthesis and deposition approaches. The most promising sensors showed selectivity to methanol over ethanol and to xylene over toluene and benzene; furthermore, Pd-doped CeO<sub>2</sub> sensors were found to be able to detect down to 150 ppb of hydrogen at room temperature.

#### FIS-PO-010. Efficient removal of perfluorooctanoic acid (PFOA) from water with magnetic metal-organic frameworks (MOF)

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