

## ITI HiFunMat Master Internship Proposal

M 1

M 2

MOFs as electrodes material for metal-ion batteries

### Internship supervisor

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Collaboration with a HiFunMat member ( <i>please indicate their name</i> )	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes :

### Student profile looked for

Master program ( <i>more than one box can be ticked</i> )	<input checked="" type="checkbox"/> Material science and engineering <input checked="" type="checkbox"/> Chemistry <input type="checkbox"/> Physics
Other indications if necessary	

### Internship description

Derivatives of Alloxazines,<sup>1</sup> bio-inspired compounds, can be used for the formation of robust pillared coordination polymers, MOFs (Metal Organic Frameworks)<sup>2</sup>. Allowing the presence of three stable redox states, the alloxazine motif, when appended with coordinating sites, can be a promising candidate for synthesizing new redox active MOFs, that can have application in energy storage devices.

We intend to extend the large library of pillared alloxazine MOFs (figure 1),<sup>3</sup> that are then incorporated into an electrode of a metal-ion cell (Li or Na). The performances of the cells are studied through electrochemical studies. In order to tune the electrochemical properties, a special attention is paid on the structural changes observed during the charge/discharge processes of the battery.



Candidates motivated by inorganic synthesis, structural characterization, electrochemical studies, and the discovery of the synchrotron are highly encouraged to apply!

1 a) S. G. Mayhew, *The effects of pH and semiquinone formation on the oxidation-reduction potentials of flavin mononucleotide*, *Eur. J. Biochem.*, **1999**, 265, 698-702; b) F. Zarekarizi, M. Joharian, and A. Morsali, *Pillar-layered MOFs: functionality, interpenetration, flexibility and applications*, *J. Mat. Chem. A*, **2018**, 6, 19288.

2 H. Furukawa, K. E. Cordova, M. O'Keeffe, and O. M. Yaghi, *The Chemistry and Applications of Metal-Organic Frameworks*, *Science*, **2013**, 341, 6149.

3 J. Casas, D. Pianca, N. Le Breton, A. Jouaiti, C. Gourlaouen, M. Desage-El Murr, S. Le Vot, S. Choua, S. Ferlay, *Alloxazine based ligands appended with coordinating groups: synthesis, electrochemical studies and formation of Coordination Polymers*, *Inorg. Chem.*, **2024**, 63, 4802-4806.