

## Synthesis of new zeolite/metal-ion materials for applications in oxidation catalysis

**Type :** internship Master 2 (deadline 05/12/2022)

**Research unit :** Institut de Science des Matériaux de Mulhouse (IS2M) / UMR 7361

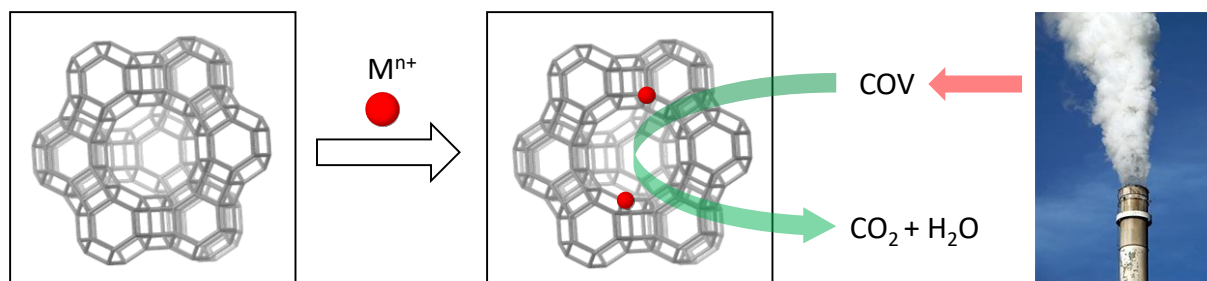
**Scientific axis :** Matériaux à Porosité Contrôlée (MPC)

**Website :** <https://www.is2m.uha.fr/en/controlled-porosity-materials/>

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### Summary :

Zeolites are microporous and crystalline inorganic materials, which can be of natural or synthetic sources. They are principally constituted of silicium oxides, but they can also include other elements such as aluminium, boron, phosphorus, or germanium. These materials are identified and classified based on their crystal structures and there exist more than 250, to date. The structures form pores with sub-nanometric size able to adsorb small molecules and this endow them with many applications in catalytic and separation processes. Nevertheless, zeolites are devoid of intrinsic redox properties and for this reason, they can be advantageously completed by the addition of metal ions ( $M^{n+}$ ). There exists different techniques allowing to insert metal ions in zeolites.<sup>[1,2]</sup> The proposed project target the development of new hybrid materials (zeolites/metal ions) with a strong potential in oxidation catalysis for industrial chemistry and especially for the decontamination of gaseous emission associated with industrial activities and transport (volatile organic compounds).



**Keywords :** inorganic chemistry – mineral synthesis – screening of reaction conditions – materials characterisation – structural analysis – adsorption properties

**Eligibility criterion :** to be registered in a chemistry course at Master 2 level (or equivalent) in a University (or other higher education establishment) in a European Union member state. The candidates, which are not fulfilling this criterion, will not be considered.

**Expected skills :** Motivated, interested in research, eager to learn new techniques, able to analyse results and to propose solutions, good work organisation.

**Contacts :** send a CV and a cover letter to Emmanuel Oheix ([emmanuel.oheix@uha.fr](mailto:emmanuel.oheix@uha.fr)) and Jean-Louis Paillaud ([jean-louis.paillaud@uha.fr](mailto:jean-louis.paillaud@uha.fr))

<sup>1</sup> N. Kosinov, C. Liu, E. J. M. Hensen, E. A. Pidko, *Chem. Mater.*, **2018**, *30*, 3177-3198,

<sup>2</sup> Q. Zhang, S. Gao, J. Yu, *Chem. Rev.*, **2022**, ASAP article.

<https://pubs.acs.org/doi/10.1021/acs.chemrev.2c00315>