

## MS35-P10

**Exploring the catalytic performances of a series of bimetallic MIL-100(Fe-Ni) MOFs**

Monica Gimenez-Marques<sup>1</sup>, Andrea Santiago-Portillo<sup>2</sup>, Sergio Navalón<sup>2</sup>, Farid Nouar<sup>3</sup>, Hermenegildo Garcia<sup>2</sup>, Christian Serre<sup>3</sup>

1. Instituto de Ciencia Molecular (ICMol), Universidad de Valencia, c/ Catedrático Jos Beltrán, 2, 46980 Paterna, Spain, Paterna, Spain
2. Department of Chemistry and Instituto de Tecnología Química (ITQ-CSIC-UPV), Valencia, Spain
3. Institut des Matériaux Poreux de Paris, Ecole Normale Supérieure, Ecole Supérieure de Physique et de Chimie Industrielles de Paris, FRE CNRS 2000, Paris Research University, 75005 Paris, France., Paris, France

**email:** [monica.gimenez-marques@uv.es](mailto:monica.gimenez-marques@uv.es)

The development of multifunctional solid catalysts is currently of foremost relevance in the field of heterogeneous catalysis. The reason is that it is expected that bi/multi-functionalization achieve specific reactions in one single step thus noticeably reducing processing costs. In this context, Metal-Organic Frameworks (MOFs) can play a crucial role given their chemically modulable nature and their already proved suitable performance as solid heterogeneous catalysts for specific liquid phase chemical transformations. The synthesis of stable mixed-metal MOFs however, is not always obvious and requires a control of the metal stoichiometry based on cations with different oxidation states and therefore very distinct chemical reactivities.

In this work we present a series of mixed-metal Fe<sup>III</sup>/Ni<sup>II</sup> MOFs of the MIL-100 type material containing different metal ratios. The resulting heterometallic MIL-100(FeNi) materials maintain thermal, chemical and structural stability with respect to the parent MIL-100(Fe) MOF as can be deduced from XRPD, N<sub>2</sub> adsorption, FTIR and thermal analysis. The nature and the oxidation state of the accessible cations have been evaluated by *in situ* infrared spectroscopy analysis. The obtained mixed-metal MIL-100(FeNi) MOFs and the parent MIL-100(Fe) material have been evaluated as heterogeneous catalysts in a model acid-catalyzed reaction such is the Prins reaction. It is found that the catalytic activity improves more than one order of magnitude for a certain metal substitution, with a complete selectivity for the formation of Nopol. The proposed mechanism will be discussed.

**Keywords:** MOFs, heterogeneous catalysis

## MS35-P11

**Sulfur polyconjugated organic ligands as building block in photoactive metal-organic frameworks**

Alba García Sánchez<sup>1</sup>, Marta Liras<sup>1</sup>, Fernando Fresno<sup>1</sup>, Mariam Barawi<sup>1</sup>, Enrique Gutiérrez-Puebla<sup>2</sup>, Ángeles Monge<sup>2</sup>, Felipe Gándara<sup>2</sup>, Víctor A. de la Peña O'Shea<sup>1</sup>

1. Photo Activated Processes Unit, IMDEA Energy, Móstoles, Spain
2. Instituto de Ciencia de Materiales de Madrid, CSIC, Madrid, Spain

**email:** [alba.garcia@imdea.org](mailto:alba.garcia@imdea.org)

Metal-organic frameworks or MOFs, are relative recent hybrid structures form by the joint between metal clusters and organic ligands. These networks have raised notable research interest because of their components are responsible for the structure properties resulting in a wide range of applications. Therefore, the appropriate choice of these building blocks could improve its features and direct the properties towards different applications like catalysis, gas separation and storage, magnetism, sensors, drug delivery [1].

Here we report the synthesis of photoactive MOFs with the combination of hole transport sulfur-conjugated ligands and different metals such as bismuth and indium. The use of electroactive organic ligands can provide charge transfer phenomena in these tridimensional networks and can leads to significant electronic interactions with the metal center-coordinated metal ions under light irradiation leading to an improvement of the optoelectronic and photo-catalytic properties [2]. In addition, a metal-node with relative large ionic radius with possibility of act with high oxidation state and empty orbitals to accept electron transfer is desired.

The opto-electronic and conductive properties of these networks have been determined by several characterization tools. Transient absorption spectroscopy reveals different electron-hole recombination rates compared with the corresponding metal oxides. Moreover, photocurrent measurements reveals changes in the conductivity in function of the used metal node.

In this way we have study the expected potential properties of these specifically tailored structures to their application into photocatalytic reactions.

