

# Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website [www-csc.utt.fr](http://www-csc.utt.fr))

Supervisor's name : Olivier Given names : GUILLOU

Status (prof., assistant prof., ...) : Prof.

Laboratory : INSA Rennes, Solid State Chemistry and Materials Team Website address :

Institution : INSA Rennes Website address :

Scientific competence of the supervisor:

Supervisor: synthesis of coordination polymers and MOFs, structural characterizations, study of the luminescent properties of coordination polymers; Co-supervisor: synthesis of coordination polymers and MOFs, structural characterization from single-crystal and powder X-ray diffraction data, study of the reactivity of MOFs (activation, guest inclusion, thermal stability).

Two major publications in the field proposed for the PhD :

1. Chem. Soc. Rev. 2012, 112, 1105-1125
2. Chem. Soc. Rev. 2017, 46, 3242-3285

Website address of the personal page : <https://iscr.univ-rennes1.fr/coordination-compounds-optic-gas-storage>

Supervisor's email : [olivier.guillou@insa-rennes.fr](mailto:olivier.guillou@insa-rennes.fr)

Description of the research work proposed for a PhD Topic # (see list) : IV-11

Title : Luminescent MOFs as chemical sensors

Subject :

Metal-Organic-Frameworks (MOFs) are coordination compounds with organic ligands and metal centers containing potential voids. These materials have been extensively studied over the last twenty years due to the variety and modularity of their crystalline architectures, their porosity and therefore their applications for the storage of molecules, purification, separation, catalysis and even the controlled release of active ingredients. MOFs built from transition metals combine the properties of porosity with luminescence which make them the materials of choice as chemical sensors. Indeed thanks to their structural versatility they are able to host molecules with various size, shape and functionality. A judicious choice of the ligand and metal cations would offer to detect various species like cations, anions, molecules and vapors. The PhD thesis will consist in the synthesis, structural characterization of luminescent MOFs. The luminescent properties of the MOFs loaded with various analytes will be studied and the influence of the nature of the cations and linkers on the detection and its selectivity in case of a mixture of analytes will be evaluated.

Keywords :

Metal-Organic-Frameworks, coordination polymers, luminescence, chemical sensors

Expected collaborations :

Theoretical calculations and in situ powder X-ray diffraction with colleagues in University of Rennes 1 and Ecole Nationale Supérieure de Chimie de Rennes (ENSCR) on the same campus in Rennes.

Background required from the applicant :

Chemical synthesis, solid state chemistry, structural characterization (XRD, IR), TGA/DSC, luminescence characterization (UV-vis spectroscopies), B2 level in English

Existence of a PDF file detailing the proposal ("yes" or "no") : yes

(see guidelines on the website [www-csc.utt.fr](http://www-csc.utt.fr))