



## Internship offer

<b>Title</b>	<b>MOF thin film synthesis by direct growth on surfaces</b>
<b>Laboratory</b>	Laboratoire PMC – Ecole Polytechnique – Route de Saclay – 91128 Palaiseau
<b>Contact</b>	Catherine de Villeneuve / Clémence Badie
<b>email/ telephone</b>	<a href="mailto:catherine.henry-de-villeneuve@polytechnique.edu">catherine.henry-de-villeneuve@polytechnique.edu</a> Tel : 33 (0)1 6933 4664 <a href="mailto:clemence.badie@polytechnique.edu">clemence.badie@polytechnique.edu</a>
<b>Date of publication</b>	2025/11/06
<b>Observations</b>	Starting date to be defined with the candidate

MOFs (Metal Organic Frameworks) are porous crystalline solids exhibiting high specific surface areas and tuneable physico-chemical properties. These materials are very promising for numerous applications (e. g. gas/liquid storage, membranes, (photo)catalysis, sensors, (opto)electronics). Currently, these materials are mainly synthesized as (nano)crystalline powders in solution. The development of procedures allowing for their growth in a control fashion on solid surfaces is of prime interest for their integration in devices.<sup>1,2</sup>

The objectives of the internship are twofold:

- 1/ the development of a growth method in liquid phase allowing for the direct growth of MOF layers on surfaces using a “layer by layer” approach.
- 2/ The investigation of the properties of the MOF layers within the context of their use for the capture/photo-degradation of pollutants.

This internship covers the entire research workflow: from sample preparation using growth processes in solution, through the characterization of the MOF layers using various techniques and data analysis and processing. The characterization techniques are namely: X-ray diffraction/reflection (XRD, XRR), scanning electron and atomic force microscopies (SEM and AFM), as well as optical spectroscopic techniques (FTIR, Raman, UV-vis, ellipsometry).

The intern will gain valuable background in thin film synthesis in solution, MOF's chemistry, characterizations, data processing and analysis, and electrochemistry.

**References:** [1] A. Bétard and R. A. Fischer, *Chemical Reviews*, 2012, 112, 1055-1083. [2] I. Stassen, N. Burtch, A. Talin, P. Falcaro, M. Allendorf and R. Ameloot, *Chemical Society Reviews*, 2017, 46, 3185-3241. 17.

**Profile:** We are seeking for a highly motivated Master 2 student in Materials Science, Chemistry, or a related field to join for a comprehensive, hands-on research internship.

The ideal candidate is highly interested about thin film deposition in solution, MOFs, and catalysis. The trainee is curious, proactive, and motivated to learn new techniques, along with strong analytical and problem-solving skills in teamwork.

**Internship remuneration:** YES, legal remuneration

**Possibility of a PhD:** YES, through the Doctoral School competition at Institut Polytechnique de Paris (IPP)