

Synthesis of metal-organic frameworks (MOF) at the liquid – liquid interface.

The interface between two immiscible (or partially miscible) liquids is a unique environment. It has attracted considerable attention when it comes to solid phase interfacial deposition. The examples of liquid – liquid interface (LLI) decoration start with nanoparticles (i.e. Au NPs for liquid mirror applications¹), metal oxides², silica material³, polymers⁴ etc.

Among LLI qualities, which are unique with regard to synthesis of new materials one can include: (i) lack of defects down to molecular level (lack of preferential nucleation side allow the study of nucleation process), (ii) possibility of the separation of two reagents between contacting phases and (iii) discontinuous properties of the liquid – liquid interface, which allow the formation of so called Janus materials – materials possessing different physical properties on opposite sides.

In this study, the synthesis of metal-organic framework (MOF) at the liquid – liquid interface will be explored. For this reason, the aqueous phase containing one of the reagents (cationic metal ion or organic precursor) will be put in contact with the organic phase containing counter reagent (organic precursor or cationic metal ion respectively). Influence of ethanol, ration between the cationic metal ion and organic precursor on the film formation and its morphology will be evaluated.

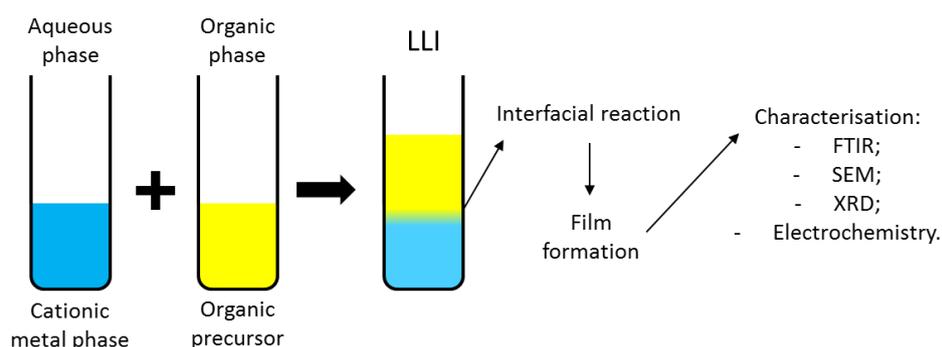


Figure 1. Schematic of experimental idea.

Techniques that will be used among this study:

- **FTIR** (Fourier transform infrared spectroscopy);
- **XRD** (X-ray diffraction spectroscopy);
- **SEM** (Scanning Electron Microscopy);

- **N₂** adsorption/desorption;
- **Cyclic voltammetry;**

Potential applications:

MOF are known as high specific surface area materials that can be employed in the filtration systems, separation, sensors (...)

Literature:

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- (2) Manjunatha, S.; Panchakarla, L. S.; Biswas, K.; Rao, C. N. R. Nanorods and Nanofilms of ZnO Generated at the Liquid–liquid Interface. *Inorganica Chim. Acta* **2010**, 363 (10), 2125–2130.
- (3) Poltorak, L.; Herzog, G.; Walcarius, A. Electrochemically Assisted Generation of Silica Deposits Using a Surfactant Template at Liquid/liquid Microinterfaces. *Langmuir* **2014**, 30 (38), 11453–11463.

- (4) Ma, H.; Geng, Y.; Lee, Y.-I.; Hao, J.; Liu, H.-G. Free-Standing poly(2-Vinylpyridine) Foam Films Doped with Silver Nanoparticles Formed at the Planar Liquid/liquid Interface. *J. Colloid Interface Sci.* **2013**, *394*, 223–230.