# Master 2 Internship Proposal

**Title: Elaboration of mesoporous conducting polymer layers for ammonia sensor**

**Internship supervisor**

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| Laboratory | Institut Charles Sadron - – Campus de Cronenbourg - Strasbourg |
| Collaboration with | Nicolas Leclerc and Olivier Bardagot (ICPEES), Patrick Lévêque (ICube) |

**Student profile looked for**

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| Master program (*more than one box can be ticked)* | ☒ Material science and engineering ☒ Chemistry ☐ Physics |
| Other indications if necessary | |

## Internship description

### Context

With the expansion of the myriad applications for ammonia, the development of reliable, low-cost detectors has become a socio-economic necessity. However, there are still many advances to be made to ensure high sensitivity, selectivity and stability of the sensors.

Our project is focusing on three main innovations which, combined, should enable the selective detection of low concentrations of NH3 using organic field effect organic transistors. [1]

(i) New n-type air-stable conducting polymers based on PNDI-2T, highly sensitive to NH3 (ii) Mesoporous thin films of these polymers in order to increase sensitivity; iii) A new method for processing data measured by OFETs to increase selectivity.

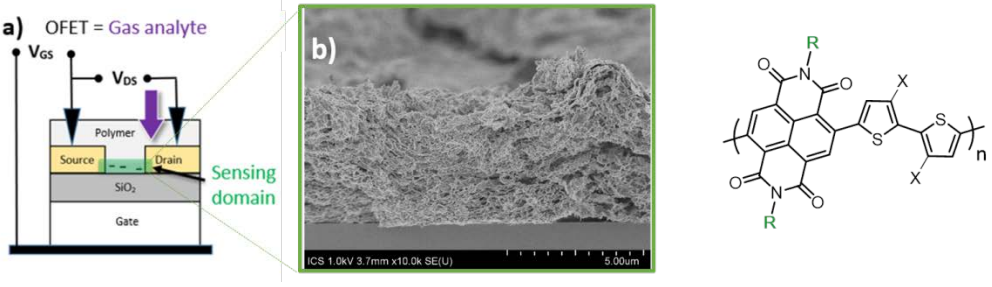


**Figure: Field effect transistor schematic which sensing domain is composed of n-type porous conducting polymer.**

**Objective**

The aim of this internship is to develop new processing methods to promote the self-assembly of polymer chains in solution. This will play an important role in the charge transport properties in the solid state. Then, porosity will be introduced using the freeze-drying method. [2]. The effect of freezing conditions (solvent, freezing rate, freezing temperature) will be modulated to control the porosity of the films. The structure of the films will be characterized by scanning electron microscopy. The final aim is to fabricate field effect transistors (with porous conducting channels) and characterize the charge transport properties under ammonia exposure.

References:

[1] O. Bardagot, P. Lévêque et al. J. Mater. Chem. C **11** (2023) 14108.

[2] Q. Weinbach, L. Biniek et al, J. Mater. Chem.C (2023), 11, 7802-7816

**Requirements & Application**

We are looking for motivated and creative team-worker master student interested in organic electronics and willing to learn about polymer science, scanning electron microscopy, and charge transport properties. The candidate is expected to be at ease with physical-chemistry of polymers and not afraid of multidisciplinary field.

Please address your application including a CV, a motivation letter and Master transcript of records to Laure Biniek, SYCOMMOR Team, Institut Charles Sadron.

Possible starting date : Jan- February 2025

***Note that the lab is within a ZRR (Zone à Régime Restrictive)**