



This project is for a master 2 student in the field of Chemistry, Physico-Chemistry or Material Science. It requires a strong motivation for experimental work and an ability to understand the multidisciplinary aspects of the project such as electrochemistry, optic, materials synthesis *etc.* For more information and to apply please contact **Thomas Cottineau** ([cottineau@unistra.fr](mailto:cottineau@unistra.fr)) or **Olivier Bardagot** ([bardagot@unistra.fr](mailto:bardagot@unistra.fr)) ICPEES (campus Cronenbourg ZRR).

**Daily work will include:**

- Bibliographic study of the bilirubin/TiO<sub>2</sub> interactions
- Processing of (semi)conducting polymers in solution (mainly PEDOT:PSS)
- Synthesizing TiO<sub>2</sub>-Nanotubes gate electrodes
- Molecule grafting on TiO<sub>2</sub> (physico-chemistry of interfaces)
- Scanning electron microscopy (SEM) to visualize the resulting gate electrodes
- OPECT manufacture
- Electrical characterization of OPECT (transfer, output)
- Time-resolved Vis/NIR absorbance spectroscopy during OPECT operation
- Data analysis using Python (computing)
- Calibration and use in 'test' and 'applicative' conditions of novel biosensors
- English writing and oral presentation

**Hard skills which will be learnt:**

- Bibliographic search
- Database management
- 
- Electrochemical synthesis
- Surface chemistry
- Polymer processing
- Vis-NIR absorbance spectroscopy
- Electrochemistry
- Computing (Python for heavy data analysis and graph plotting, LabVIEW if interested)

**Soft, transferable, skills which will be learnt:**

- Collaboration, teamwork
- Effective communication
- Scientific data presentation (oral and written in English)
- Project management (time management, supply management, etc)
- Progress reporting
- Creativity/independency (depending on the will of the student)

**References:**

1. **High-performance OECT manufacture:** O. Bardagot\*, P. Durand, S. Guchait, G. Rebetez, P. Cavassin, J. Réhault, M. Brinkmann, N. Leclerc, N. Banerji, *In Review - Nature Materials*, **2023**, 10.21203/rs.3.rs-3221543/v1
2. **OECT doping kinetics:** B. T. DiTullio, L. R. Savagian, O. Bardagot, M. De Keersmaecker, A. M. Österholm, N. Banerji, J. R. Reynolds, *J. Am. Chem. Soc.* **2023**, *145*, 122–134.
3. **TiO<sub>2</sub> Nanotube synthesis:** F. Gelb, Y.-C. Chueh, N. Sojic, V. Keller, D. Zigah, T. Cottineau\*, *Sustainable Energy Fuels* **2020**, *4*, 1099–1104.
4. **TiO<sub>2</sub>-based sensors:** D. Spitzer, T. Cottineau, N. Piazzon, S. Josset, F. Schnell, S. N. Pronkin, E. R. Savinova, V. Keller, *Angewandte Chemie International Edition* **2012**, *22*, 5334–5338.
5. **TiO<sub>2</sub>-gated OECT:** M.-J. Lu, F.-Z. Chen, J. Hu, H. Zhou, G. Chen, X.-D. Yu, R. Ban, P. Lin, W.-W. Zhao, *Small Structures* **2021**, *2*, 2100087.