Post-doctoral fellowship

“Conducting polymers with ionic liquids functions for the development of chemical (bio)sensors”

Context and objectives of the project

Organic conducting polymers (CPs) are a highly studied class of materials due to their tunable electrical properties and ease of synthesis that can be achieved by either by chemical oxidation or electrochemical polymerization. Research on CPs has given rise to many applications in the field of organic electronics, the development of batteries or the preparation of anti-aging materials. Another possible application of these conductive polymers is in the field of chemical (bio) sensors. Indeed, in this domain, CPs have certain advantages such as their sensitivity, selectivity and lifetime. Thus, CPs can be integrated into sensors such as immunosensors, DNA sensors but also environmental sensors. On the other hand, ionic liquids (ILs) are well known for their use in the fields of organic synthesis, catalysis and electrochemistry. Their interest is based on the modularity of the nature of the cation and the anion. They can be synthesized specifically depending on the target applications. In addition, ILs are known for their good biocompatibility with biomolecules and enzymes, and they are also known to improve enzymes stabilities. Finally, they are also widely used for gas detection. ILs are therefore prime candidates for the development of electrochemical (bio) detection platforms. To our knowledge, the application of CPs containing ILs functions as chemical (bio)sensors is rather limited.

In the frame of the MatElectroCap project between UTINAM (Besançon, France) and ICMUB (Dijon, France) the objectives of this post-doctoral fellowship will be to synthesize new monomers bearing ionic liquids functions that will then be electropolymerized to obtain original CPs. These functional materials will further be used in the fields of organic electronics and (bio) sensors.

Work of the post-doctoral fellowship:

- Organic synthesis to elaborate original monomers some of them derived from ILs.
- Polymerization of these monomers by electrochemistry. Characterization of the obtained films by numerous techniques available within the UTINAM institute (profilometry, SEM and AFM microscopy, glow-discharge optical emission spectroscopy).

- Chemical detection of different analytes including gases but also liquid phase analytes.
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Candidate profile:

We are looking for a candidate with a Ph.D. in organic synthesis and/or polymer science. Good skills in organic synthesis or in electrochemistry are required. Additional skills in the field of (bio)sensing would be appreciated. The candidate must also have expertise in standard analytical techniques for characterization of molecules and materials (NMR, Raman, IR). Experience in other techniques (SEM, AFM, GDOES) will be viewed positively as well.
He/she will be responsible for performing designed experiments independently, reporting the experimental results and progresses periodically in the research meetings Good scientific writing ability and oral communication skills are required.

Location: Institut UTINAM-UMR CNRS 6213 Equipe "Matériaux et Surfaces Fonctionnels" UFR des Sciences et Techniques, Bât C 16 Route de Gray, 25030 BESANCON, France

Duration: 18 months, starting February 2022

Salary: approx. 2000€ per month

Deadline for application: 30/11/2021

To apply Please send your CV and reference letters by e-mail to

Pr. Boris LAKARD
boris.lakard@univ-fcomte.fr

Dr. Lydie VIAU
Lydie.viau@univ-fcomte.fr