PhD position on Chiral supramolecular π-Conjugated materials for optoelectronics

Place: Institut des Sciences Chimiques de Rennes (UMR 6226), France
PhD CNRS (European ITN Funding – HEL4CHIROLED MSCA Project, Grant Agreement No. 859752).
Duration: 36 months
Expected starting date: 01.10.2020
Full-time work, with a remuneration around **3050 € per month**, plus travel and family allowances.
Supervisor : Jeanne Crassous (**Jeanne.crassous@univ-rennes1.fr**)

The goal of this PhD is to develop chiral Organic Light-Emitting Diodes (OLEDs) and Organic Light-Emissive Transistors (OLETs) based on new small helical molecules or chiral supramolecular systems. It will take advantage of two novel concepts: *i*) the Chiral Induced Spin Selectivity (CISS) effect,[1] and *ii*) the emission of circularly polarized light (CPL).[2] Furthermore, CPL is central to a large range of current and future technologies and so CP light emitting devices would allow for additional functionalities (stereoscopic [3D] displays, enhanced bandwidth optical communication, *in vivo* imaging). These goals require to make progress in 1) the development of strongly emissive chiral molecular and supramolecular materials suitable for integration into device technologies, 2) the study of their properties, and 3) the production of proof-of-concept devices.

The main part of the project will be devoted to the synthesis of chiral organic and organometallic molecules[3] with different electronic properties and the study of their photophysical and chiroptical properties (UV-vis absorption, circular dichroism, circularly polarized luminescence) in solution and immobilized on surfaces. Applications in optoelectronic devices and chiral electrochemical sensing will then be conducted depending on the obtained chiroptical properties.

This PhD position lies within the framework of a European ITN project: HEL4CHIROLED "*Helical molecular and supramolecular systems for chiral organic light emitting diodes*". Under the supervision of **Jeanne Crassous**,[3] the PhD will study and perform synthetic chemistry, perform photophysical measurements, study applications in optoelectronic devices, and be in relation with topics in chirality and in physics (spin selectivity). He/ She will be also involved in scientific/soft-skills meetings and in research activities conducted in other laboratories/companies from Europe and associated countries (especially Israel and Switzerland).

The candidate must have a master's degree in chemistry. The position requires knowledge in chirality, skills in synthetic chemistry (organic and organometallic), purification methods, characterization techniques, spectroscopic tools, data processing software's, a high level of oral and written (French and English required) communication skills, to be able to present at conferences and write articles in scientific publications; flexibility, adaptability, and creativity. We are looking for a PhD fellow who will be able to become fully involved within the project, with a thirst for knowledge, a certain independence of thought and strong motivation to develop scientific skills in chiral materials science, together with soft skills. In addition, the candidate must be able to work in a team on multi-disciplinary projects.

The applicant must have not resided in France (neither have carried out their main activity in the country) ***for more than 12 months in the 3 years immediately before the recruitment date***, unless as part of a procedure for obtaining refugee status under the Geneva Convention.

Applications must include a detailed CV including at least two references (people who may be contacted), a cover letter of one page, a one-page résumé of the dissertation for the Masters, and the grades for the Masters 1 or 2 or the engineering degree; and they should be send to **Jeanne.crassous@univ-rennes1.fr**

Our Institute is submitted to security conditions (Restricted Research Zone, ZRR).

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[1] a) B. Goehler *et al.*, *Science,* **2011***, 331*, 894; b) P. C. Mondal, C. Fontanesi, D. H. Waldeck, R. Naaman, *Acc. Chem. Res.* **2016***, 49*, 2560; c) C. Fontanesi, *Current Opinion in Electrochemistry*, **2018**, *7*, 36.
[2] a) Y. Yang *et al.*, *Adv. Mater.* **2013**, *25*, 2624; b) F. Zinna *et al.*, *Adv. Mater.* **2015**, *27*, 1791; c) E. Peeters *et al.*, *J. Am. Chem. Soc.* **1997***, 119*, 9909; d) S. M. Jeong *et al.*, *App. Phys. Let.* **2007**, *90*, 211106; e) J. R. Brandt *et al. J. Am. Chem. Soc.* **2016**, *138*, 9743; f) F. Zinna *et al., Adv. Funct. Mater.* **2017***, 27,1603719.*
[3] a) N. Saleh, C. Shen and J. Crassous, *Chem. Sci.* **2014***, 5*, 3680; b) C. Shen *et al.*, *Angew. Chem. Int. Ed. Engl.* **2016***, 55*, 8062; c) N. Hellou et al., *Angew. Chem. Int. Ed.* **2017**, *56*, 8236; d) P. Josse et al. *Chem. Eur. J.* **2017***, 23,* 6277.