## Post-Doctoral Fellow in Molecular Chemistry (1 year)

***Synthesis and Studies of host materials with very high triplet state energy levels for deep blue phosphorescent Organic Light-Emitting Diode***

Organic electronics (OE) is playing an increasingly important role in modern electronics and is expected to become a key player of the electronics of the future.[1] This technology relies on the use of organic semiconductors and phosphorescent organic light-emitting diode (PhOLED) is currently the most mature technology. A PhOLED consists of a light-emitting layer sandwiched between several organic functional layers and two electrodes. Upon application of an electric field, the device emits light through electroluminescence. In a PhOLED, the emissive layer is composed of a host–guest system comprising an organic host material and a phosphorescent organometallic emitter. Its operating principle relies on the generation of electron–hole pairs (excitons) within the host, followed by energy transfers to the phosphorescent emitter, where light emission takes place. Over the past decade, a significant fraction of PhOLED research has focused on the development of host materials with properties tailored to phosphorescent emitters. Molecular engineering of these hosts has enabled continuous improvements in device performance, with external quantum efficiencies now exceeding 30%.[2] In this context, our group at the Institut des Sciences Chimiques de Rennes (ISCR) has become an internationally recognized leader in the field of host materials. Over the past few years, thanks to very efficient molecular designs, we have reported several world-record PhOLED performances.[3-10]

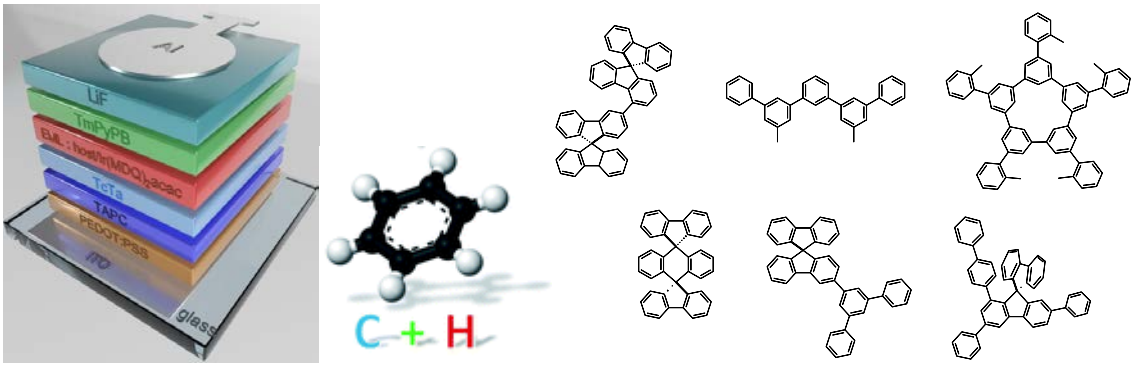


Figure 1: Archuitecture of a PhOLED (Left). Examples of structures of Pure hydrocarbon-based host materials recently used in PhOLED (Right).[8, 9]

However, OLED technology still faces a major challenge. The presence of heteroatoms (N, S, P, O, etc.) in the molecular structure of host materials compromises device operational stability owing to the intrinsic weakness of carbon–heteroatom bonds.[11] Consequently, increasing research efforts have recently focused on **Pure HydroCarbon (PHC)** host materials, composed exclusively of carbon and hydrogen atoms. After a slow start, major breakthroughs have been achieved in recent years. Our group has played a leading role in these advances, reporting landmark results that demonstrate the remarkable efficiency and tremendous potential of PHC hosts for PhOLED applications.[3-5, 7-10] Importantly, this concept has been extended to materials for the last generation of hyperfluorescent OLEDs[12] and even for ultraviolet organic lasers.[13]

The objective of the present project is to take a significant step forward by developing a new generation of π-conjugated PHC host materials for deep-blue PhOLEDs, which currently represent the main bottleneck for OLED technology. The project will explore original molecular design strategies to develop PHC hosts

exhibiting very high triplet energies (>3.0 eV). As such materials remain extremely rare in the literature, the project is highly innovative and pioneering.

The project is at the forefront of international research and will be carried out in collaboration with Soochow University (Prof. Z. Jiang, China) and the l'Institut d'Electronique et des Technologies du numéRique (IETR) (Dr. E. Jacques, Dr F. Lucas, Rennes, France), which will be responsible for the fabrication and characterization of the devices. The group of Prof Cornil (UMons, Belgium) will also be involved for theoretical calculations.

We are seeking a highly motivated researcher who **obtained a PhD in organic chemistry within the past two years and has a strong background in synthetic organic chemistry.** A genuine enthusiasm for research is essential. Experience in organic electronics, electrochemistry and/or photophysical characterization would be considered an asset.

The successful candidate will join the Condensed Matter and Electroactive Systems (MaCSE) group at the Institut des Sciences Chimiques de Rennes (ISCR) and will work within the research group led by Cyril Poriel. The project will be supervised by Cyril Poriel (CNRS Research Director) and Cassandre Quinton (CNRS Research Scientist). Prospective candidates are encouraged to contact C. Poriel and C. Quinton for further information about the project.


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- Localisation : ISCR, bâtiment 10C, 3ème étage, bureau 241/ 254.
- Starting date: **15 Janvier 2027 au plus tard**
- Contract Duration : 1 year
- Application documents: A detailed curriculum vitae (including the contact details of the PhD supervisor(s)), a cover letter, and a brief summary of the PhD research (maximum 3 pages).

References


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