
The host group, localized at the Institut des Sciences Chimiques de Rennes at the Université de Rennes 1, possesses recognized experience in the field of organic materials for organic electronics and especially for applications in the field of phosphorescent Organic Light Emitting Diodes (OLEDs).

The objective of the present PhD is to synthesize and study organic host materials for phosphorescent OLEDs. A phosphorescent OLED is an electronic component which emits light. It is constituted of a light emissive layer deposited between two electrodes. OLEDs belong to the new generation of electronic components using organic materials, so called Organic Electronics or Plastic Electronics. This electronics displays many advantages such as the possibility to be deposited on foldable/flexible substrate (Fig. 1). In the last months, the first foldable/flexible/rollable electronic devices have become commercially available (Fig. 1), providing new directions for the future of electronic display.

![Figure 1: Structure of an OLED (left) and example of flexible/rollable OLEDs based electronic devices.](image)

In a phosphorescent OLED, the emissive layer is constituted by a phosphorescent light emitter dispersed within an organic host matrix (Fig. 1, left). The present works will notably deal with the synthesis and characterization of these host matrices before incorporation in electronic devices. In order to reach high performance devices, the host material should possess precise electronic properties. The molecular design of the host is hence highly important and is the heart of this project. Herein, we will be interested by Donor/Acceptor molecules, some examples are provided in Fig. 2. The molecules are constructed on a similar design, the association of an electron-rich fragment (quinolinophenothiazine coloured in blue) and an electron-poor unit (phosphine oxide, triazole or oxadiazole, coloured in red).

![Figure 2. Selected examples of organic host materials investigated in this project](image)

The scientific methodology is divided in three main tasks: Synthesis, determination of the properties (electrochemistry, absorption and emission spectroscopy) and incorporation in devices. This last part will be done in collaboration.

The present PhD is highly multidisciplinary and will involve synthesis (70%) and characterization (30%, fluorescence, electrochemistry, molecular modelling) of π-conjugated molecular systems. The PhD work is based on organic chemistry of semi-conductors and the candidate should have excellent skills in organic synthesis. A high dynamism and a strong motivation for research are mandatory. This candidates are invited to contact C. Poriel/ C Quinton to discuss about this project.

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Selected references [1] [2]