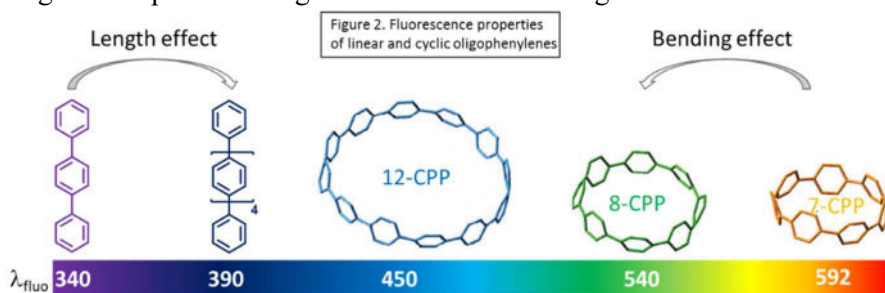


PhD in Molecular Chemistry: Size effect in donor-acceptor nanohoops

The host group, localized at the Institut des Sciences Chimiques de Rennes at the Université de Rennes, possesses recognized experience in nanohoops for organic electronics.^[1]

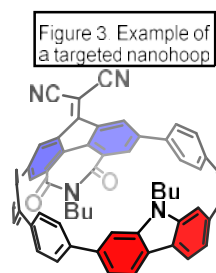
The objective of the present PhD is to synthesize new generations of organic semi-conductors (OSC) for Organic Electronics. Organic Electronics or Plastic Electronics displays many advantages such as the possibility to be deposited on foldable/flexible substrate (Fig. 1). The heart of an electronic device is the OSC. For more than 20 years designing OSCs has been an intense research field worldwide, which have allowed the huge development of Organic Electronic technologies.



However, fundamental researches are still needed to develop new generations of OSCs possessing notably 3D charge transport. Thus, the present PhD position will deal with the synthesis and the characterization of new generations of organic

materials only discovered fifteen years ago: **Molecular Nanohoops**. Indeed, since their discovery in 2008, hoop-shaped π -conjugated macrocycles (so called 'nanohoops') have been the subjects of intense researches. Compared to their linear counterparts, nanohoops possess unique electronic and structural characteristics^[1e, 2] and uncommon evolution of these properties upon size (Fig. 2).^[1b, 3]

In 2025, the research on nanohoops has gone one step further as donor-acceptor nanohoops have been synthesized and their intramolecular charge transfer (ICT) properties have been fully characterized for the first time.^[4] However, the ICT properties of nanohoops are almost unknown in the literature and everything remains to be explored. This project displays hence a pioneer character, nevertheless some works related to donor-acceptor nanohoops have already been achieved in our team.^[1a, 3b, 5] The scientific methodology will be divided in three main tasks: **Synthesis of the nanohoops (Fig. 3), determination of their physical/electronic properties (electrochemistry, absorption/emission spectroscopy, molecular modelling) and incorporation in electronic devices.** This last part will be done in collaboration.



The present work is highly multidisciplinary with a strong emphasis on organic chemistry. The candidate should hence have excellent skills in molecular synthesis. Determination of electronic properties (UV-vis spectroscopy, electrochemistry, molecular modelling) could be acquired by internal lab training. A strong motivation for academic research is mandatory. The candidates are invited to contact C. Poriel (DR CNRS) / C. Quinton (CR CNRS) to discuss about this project.

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