

## Signatures of optically and electrically injected charges in rubrene single crystals

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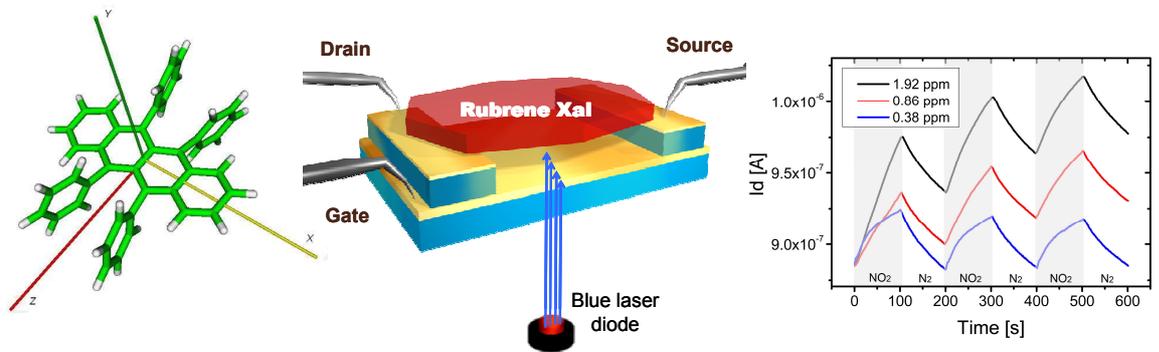
Soutenance de thèse

Vendredi 19 Septembre 2008 à 15h30

Amphithéâtre ASTIER, Espace Esclançon (angle rues Jussieu et Cuvier)

Université Pierre et Marie Curie

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Rubrene single crystals are of particular interest in the field of organic electronics due to the high level of charge carrier mobilities measured in transistors. In this thesis, we explore the photocurrent properties of rubrene single crystals in 'air-gap' transistors whose structure allows the measurement of photocarrier dynamics without the influence of a dielectric that can act as a source for traps. This structure has allowed us to identify phenomenon like persistent photoconductivity associated with the creation of oxygen related traps on the rubrene surface as well as the presence of bimolecular recombination of the photocarriers. We have also performed studies including Raman spectra measurements which revealed the endoperoxide signature on the surface of the crystal while also confirming the low level of intermolecular coupling. The impact of photo-oxidation on the surface conductivity was evaluated by a novel experiment involving the gradual photo-oxidation of the rubrene surface using a focussed laser. The creation of a deep acceptor state that can trap electrons indicates that the electrical properties of the rubrene surface such as unipolar p-type conductivity and photoconductivity may be modulated by the presence of these oxygen induced states.

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