

## **Open PhD position on Organic Solar Cells at ICUBE**

**Topic:** Solution-processed bulk heterojunction devices based on bodipy and triazatruxene derivatives.

**Summary:** Organic solar cells processed from solution are currently being considered as a promising emerging low-cost technology for renewable production of electricity from solar light. The so-called bulk heterojunction (BHJ) devices, comprising a blend of electron-donor and electron-acceptor molecules as photovoltaic layer, are among the most investigated and efficient solar cell structures. Their performances strongly rely on the electronic properties of the individual molecular components and on the blend morphology. Therefore, the design of molecular systems with optimum opto-electronic properties is of major importance to the field.

This project aims to improve the efficiency of organic solar cells by investigating the physics of BHJ devices using bore-dipyromethene (BODIPY) and triazatruxene (TAT) derivatives as electron-donor material. Both, BODIPY and TAT have been used recently as constituents of new organic semiconductors for photovoltaic applications and have already led to encouraging results. Power conversion efficiencies above 5% could be demonstrated in standard devices, while values above 10% are expected under optimized conditions.<sup>1,2</sup> Ideally positioned frontier orbital energy levels, very high extinction coefficients and planar molecular conformations allowing good charge transport are among the essential features that account for these promising performances. The main goal of this project will be to identify the major efficiency limiting factors and to find ways to circumvent these. Fundamental investigations of the materials and device properties of both, previously studied compounds and new BODIPY and TAT derivatives with additional functionalities will be performed. The development of more advanced device structures, including new interfacial layers, will also be considered.

The PhD position is part to the ORION project and will be co-funded by the Agence Nationale de la Recherche (ANR) and by the Région Alsace. The position is open for applicants having a Master degree in material sciences and having been trained in semiconductor physics and devices. Skills in the field of organic semiconductor materials and devices are very welcome.

**Contact:** Prof. Thomas HEISER ([thomas.heiser@unistra.fr](mailto:thomas.heiser@unistra.fr)), supervisor.

Dr. Patrick Lévêque ([patrick.leveque@unistra.fr](mailto:patrick.leveque@unistra.fr)), co-supervisor.

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<sup>1</sup> T. Bura, N. Leclerc, R. Bechara, P. Lévêque, T. Heiser, R. Ziessel, *Adv. Energy Mater.* 2013, 3, 1118–1124

<sup>2</sup> T. Bura, N. Leclerc, S. Fall, P. Lévêque, T. Heiser, P. Retailleau, S. Rihn, A. Mirloup, R. Ziessel *J. Am. Chem. Soc.* 2012, 134, 17404–17407