PhD Project

Laboratory: MOLTECH-Anjou, UMR CNRS 6200, University of Angers (http://moltech-anjou.univ-angers.fr/)

Title: MOSA! Make OPV Simple Again!

Supervisors: Clément CABANETOS, CR-HDR CNRS (clement.cabanetos@univ-angers.fr, 02 41 73 53 47) and Philippe BLANCHARD, DR CNRS (philippe.blanchard@univ-angers.fr, 02 41 73 50 59)

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Project summary: Over the past decades, the development of organic photovoltaics (OPV) has attracted considerable research attention leading to a significant increase in photoconversion efficiencies, now reaching more than 18%. These breakthroughs result from both the device engineering and the development of organic and efficient electron donors (D) and acceptors (A) materials. However, it is noteworthy that the synthetic complexity to afford these efficient materials considerably limits their large-scale production and consequently the massive industrialization of the corresponding OPV modules.

It is precisely in this context that falls the MOSA! PhD thesis project (Make OPV Simple Again!). In order to go back to the very essence of this sector, which is the "low cost", the objective of the thesis work aims at designing original, efficient and synthesizable materials in a minimum of steps from inexpensive blocks. Moreover, effort will be put on selecting and applying methods that can be transposed on a large scale, if possible eco-friendly, to contribute to the industrial opening of OPV technology. Indeed, promising materials developed within the frame of this thesis will be shared through an already existing collaboration network (e.g. European ITN SEPOMO project) and in particular with the German company Heliatek specialized and leader in the production of vacuum processed organic photovoltaic films. In addition, and taking into account that the active layer of an organic solar cell generally results from the combination of an electron donor and an electron acceptor, the exploration of these two types of materials will be carried out. One of the innovative aspects of this thesis project will focus on the development of non-fullerene and evaporable electron acceptors, still underdeveloped within the scientific community and representing a major challenge for Heliatek.

Consequently, the recruited student will be involved in a well identified research group in the field of OPV and will benefit from all the know-how and facilities available at the MOLTECH-Anjou laboratory to carry out a multidisciplinary research thesis at the highest level. Indeed, the recruited PhD student will synthesize, characterize and evaluate his/her new materials directly in prototypes of solar devices allowing him/her to gain knowledge and develop skills in organic chemistry, physico-chemical analysis of molecules and materials and physics of components.

Profile of the candidate: He/She should be highly motivated and have a strong profile of organic chemist. Knowledge in the field of π-conjugated organic materials and electrochemical and spectroscopic techniques (UV-Visible, fluorescence) will be appreciated.

Application (deadline June 10th, 2020): The thesis project will start on October 1st, 2020. Applicants must send a CV and a motivation letter, also including a brief description of the previous Master internships to the following email addresses: clement.cabanetos@univ-angers.fr and philippe.blanchard@univ-angers.fr

Figure 1. Recent cover picture illustrating π-conjugated molecules developed within the group.