



## Melbourne-Bayreuth IRTG Joint PhD Program

### PhD Scholarship to Study Synthesis and Manipulation of Semiconducting Block Copolymers for Organic Photovoltaic active Layers

#### *Position Summary*

The Universities of Melbourne and Bayreuth have created a new, joint PhD program. Students from each University spend a minimum of 12 months at the partner University and submit a PhD thesis at each location. Students need to be Australian residents and have an undergraduate mark equivalent to those required for an APA. The project listed below is supported through the Australian Renewable Energy Agency (ARENA)

This project is a collaboration between the School of Chemistry and the Department of Physics at Universität Bayreuth. The School of Chemistry values equity and diversity and promotes an inclusive workplace culture for staff irrespective of their gender identity, ethnicity, or cultural background. We recognise that diversity drives excellence and innovation in research and teaching and a key objective is to lift the proportion of women in our workplace.

**Project Outline:** We are looking for a suitably qualified graduate student to work on a jointly funded PhD project between the University of Melbourne and the Universität Bayreuth on the induction of block copolymer self-assembly for high performance organic photovoltaic devices and the characterisation thereof. Microfluidic processing and UV irradiation of semiconducting polymer solutions have been shown to induce high degrees of crystallinity and charge mobility in subsequent organic electronics. These processes can be incorporated in-line during device production and so offer an appealing route to large scale production of high-performance electronics. However, in contrast to transistors, organic photovoltaic devices rely on a nanoscale intermixing of p-type and n-type semicrystalline materials. The application of these processing techniques to a solution blend is expected to induce large scale aggregation of both components and suboptimal device performance. The covalent linkage of the n- and p- type materials into a block copolymer, however, is expected to allow exploitation of these processing techniques to produce highly crystalline nanoscale morphologies through block copolymer self-assembly. This in turn will increase exciton separation efficiency and charge mobility in organic photovoltaic devices. We seek a PhD student to investigate the synthesis and manipulation of semiconducting block copolymers for organic photovoltaic active layers. The project will examine the morphological effects of microfluidic processing and UV irradiation of block copolymer materials and the electronic properties of the resulting films. Materials will be synthesised in the Jones and Thelakkat laboratories, with spectroscopic studies regarding the electronic and morphological structure in the A. Köhler group in Bayreuth and at the Australian Synchrotron in Clayton, Australia. The successful student will spend a minimum of 12 months at Bayreuth, Institute of Physics. Knowledge of German is not essential but useful. Students with an interest in X-ray spectroscopy/ laser spectroscopy and/or polymer synthesis are sought.

**Location:** The Organic Electronics Laboratory is located in Bio21 Institute at the University of Melbourne.

#### *Selection Criteria*

##### ESSENTIAL

- MSc or equivalent in polymer synthesis;
- Excellent written and oral communication skills;
- Demonstrated organisational skills, time management and ability to work to priorities;

- Demonstrated problem solving abilities;
- The ability to work independently and as a member of a team.

#### **DESIRABLE**

- Experience in organic photovoltaics, chemical synthesis and purification.

#### **SALARY LEVEL**

A\$31,200 p.a. stipend (tax-free). Further information on benefits is available here

<https://scholarships.unimelb.edu.au/awards/graduate-research-scholarships>

#### **START DATE**

Applications close 1 June 2020. Start date in late 2020.

#### **EMPLOYMENT TYPE**

Stipends are available for minimum 3 years, subject to satisfactory progress.

#### **CONTACT**

Dr. Valerie Mitchell & A/Prof. David Jones, Bio21 Institute and School of Chemistry, University of Melbourne email: [valerie.mitchell@unimelb.edu.au](mailto:valerie.mitchell@unimelb.edu.au), [djjones@unimelb.edu.au](mailto:djjones@unimelb.edu.au)

