



PhD Program between the Freie Universität Berlin (FUB) and the China Scholarship Council (CSC)

Open PhD position at FUB for CSC scholarship candidates 2018

Please note: the PhD position is only offered to Chinese PhD candidates for application in the framework of the FUB-CSC PhD Program.

<u>Department/Institute:</u>	Department of Physics and Helmholtz-Zentrum Berlin / Institute for Nanospectroscopy (EM-ISPEK)
<u>Subject area:</u>	Physics/Physical chemistry/Materials science
<u>Name of Supervisor:</u>	Prof. Dr. Klaus Lips
<u>Number of open PhD positions:</u>	1
<u>Type of the PhD Study:</u>	Full-time
<u>Project title:</u>	Hybrid devices harnessing spectral conversion for photovoltaics

PhD Project description:

Spectral conversion materials can re-shape the spectrum of light by controllably redistributing energy between high- and low-energy excited states. When implemented within optoelectronic devices, such as solar cells, spectral converters can modify device performance in new and interesting ways. In this project, we study organic spectral converters, consisting of dense arrays of organic chromophores, and partner with in-house technology experts to design interfaces for spectral converters with crystalline silicon and perovskite solar cells. We characterize these systems using a variety of spectroscopic methods, including steady-state and time-resolved optical measurements, synchrotron techniques, and electron paramagnetic resonance. A particular aim of the project is to develop comprehensive insight into the structure, energy levels and excited state dynamics at hybrid interfaces, formed between organic spectral converters and crystalline semiconductors. On the organic side of these hybrid interfaces, the system is characterized by localized states on the scale of molecules, and high exciton binding energy; on the crystalline semiconductor side, band structure and carrier trapping gives a near-complete description of the system. Understanding energy and charge-transfer between these material domains, across the hybrid interface, is therefore a challenge. On the other hand, these materials promise to enable new and useful optoelectronic functions, making use of complementary properties from both material domains. Successful design and characterization of these interfaces paves the way for next-generation high-efficiency optoelectronic and photoelectrochemical devices.

Language requirements:

IELTS: 6.5 or TOEFL: 95 ibt.

Academic requirements:

The applicant should have a Masters degree (or equivalent) in Physics, Chemistry, Materials Science, or a related discipline. Experience in spectroscopy is desirable, as is an understanding of semiconductor physics. The applicant must be self-directed and willing to undertake independent study as necessary for a good understanding of the project.

Information of the professor or research group leader:

The project takes place in the research group of Prof Dr Lips. Prof Lips has published over 200 research papers, focusing on silicon photovoltaics, thin film silicon heterointerfaces, electron spin resonance spectroscopy, and upconversion by organic spectral conversion, and has been cited over 3300 times. He has held over 100 invited lecture talks at numerous national and international conferences, and has 10 patents. Since 2009 he has been Vice-President of the European Society for Quantum Solar Energy Conversion, and since 2015 he is speaker of the Berlin Joint EPR Lab (BeJEL). Prof Lips is heading the Energy Materials In-Situ Laboratory Berlin (EMIL), a novel research infrastructure at the BESSY II synchrotron for energy materials and collaborates extensively with research groups nationally and internationally, particularly in Australia and the USA.

Please note: In a first step, the complete application must be submitted to the Beijing Office for evaluation by January 4th, 2018. Please do not contact the professor before. He/She will get in contact with you after having received the complete application via the Beijing Office in January.