



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

Open PhD Position at Freie Universität Berlin, offered only to Chinese CSC scholarship candidates 2019

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

<u>Department/Institute:</u>	Physics
<u>Subject Area:</u>	Nanoscale Transport / Optoelectronics
<u>Name of Supervisor:</u>	Kirill Bolotin
<u>Number of Open PhD Positions:</u>	1
<u>Type of the PhD Study:</u>	Full-time
<u>Project Title:</u>	Optoelectronics of Two-Dimensional Materials

PhD Project Description:

The goal of the project is to create and investigate a new nanomaterial – **organic molecule/two-dimensional (2D) materials heterostructures**. Two-dimensional materials, one of the hottest topic in condensed matter physics, are substances that are one or few atoms thick. The family of 2D materials includes graphene, a Dirac semimetal and a subject of a recent Nobel prize, monolayer MoS₂, an excitonic semiconductor, and hBN, an ultraflat insulator. Two-dimensional materials characterized by high carrier mobility, record thermal conductivity, and excellent mechanical properties. Organic molecules, on the other hand, are plentiful, cheap and infinitely tunable via chemical approaches. By interfacing 2D materials with organic molecules, we will combine the advantages of both materials. By engineering molecular environment of 2D materials it will become possible to create ultrastrong electrical fields, control dissociation of excitons, and to control these materials with light. 2D material/molecular heterostructures will also be used for applications in ultrasensitive photodetection, flexible electronics, and label-free biosensing.

During the project, you will: 1) Learn modern nanofabrication technology, vacuum, low temperature techniques, sensitive electronic and optoelectronic measurements approaches; 2) Grow, transfer, and stack 2D materials using custom-designed state-of-art setups; 3) Carry out photoluminescence, Raman spectroscopy, photocurrent, and electrical transport measurements on 2D material/molecular heterostructures, 4) Present conference talks, author papers and patents. 5) Work in a dynamic multinational team.

Language Requirements:

Only English is required:
IELTS: 6,5 / TOEFL: 95 ibt

Academic Requirements:

Masters in Physics, Applied Physics or Nanoscience.

Information of the Professor or Research Group Leader:

The Bolotin lab (bolotingroup.com) specializes in quantum electronics and optoelectronics of two-dimensional materials. The key experimental techniques are electrical transport, strain engineering, photocurrent spectroscopy, and state-of-art nanofabrication. The group strives to understand fundamental quantum mechanical behaviors of these materials as well as to find their new applications. The group is funded by prestigious grants from European Research Council, German Science Foundation (DFG), as well as by American funding agencies.

Please Note: In a first step, the complete application should be submitted to the Beijing Office for evaluation by January 4th, 2019. 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.