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.

Department/Institute:	Department of Physics
Subject Area:	Nanoscience, Plasmonics, Optics
Name of Supervisor:	Prof. Dr. Stephanie Reich
Number of Open PhD Positions:	1
Type of the PhD Study:	Full-time or Sandwich
Project Title:	Plasmonic Nanoparticles and Structured Light

PhD Project Description:

Plasmons are the collective excitation of free electron in a material that give rise to strong electromagnetic near fields. They find application in plasmon-enhanced spectroscopy of various flavors like surface- and tip-enhanced Raman scattering and surface-enhanced fluorescence. More recently, the coupling between plasmonic cavities and molecular vibrations was suggested to lead to effects of molecular optomechanics like collective modes, superradiation, and phonon lasing. In this research field, we study the properties of dark plasmons that have a vanishing dipole moment. We develop techniques to excite dark plasmons in metallic nanoparticles using so-called structured light where the polarization of the laser beam varies as a function of position (radial and azimuthal polarization are two examples for this). The PhD student ship may focus on different aspects of this research line, e.g., absorption by dark modes in structured light fields, simulation of optical near fields, or tip-enhanced Raman scattering and near-field microscopy. This will be decided based on the expertise and interest of the candidate.

Language Requirements:

IELTS: 6,5 / TOEFL: 95 ibt

Academic Requirements:

The successful candidate will have a M.Sc. in physics, materials science or a related field. He or she will demonstrate a genuine interest in the research project and relevant past expertise. We will evaluate applications from various subfields. Highly desired is expertise the following areas: tip-enhanced Raman scattering, near-field microscopy, preparation of structured light and laser beam profiling, electron-beam lithography for metal nanostructures, (micro)modulation spectroscopy, advanced Raman scattering, construction and validation of optical setups.

Information of the Professor or Research Group Leader:

Prof. Dr. Stephanie Reich is a world-leading expert on the properties of carbon-based nanostructures and nanoscale light-matter interaction. Being educated in Berlin, Barcelona,

and Cambridge, she became a professor at the Massachusetts Institute of Technology and now holds the Chair in Experimental Solid State Physics at the Department of Physics at Freie Universitat Berlin. One of her major research lines is to tailor plasmonic excitations in oligomers of metal nanoparticles. Prof. Reich uses specially designed light fields to excite selected plasmon modes and demonstrate their near field distribution and far-field properties. The near fields are harvested for surface- and tip-enhanced spectroscopy as well as hot electron generation. The excitation of dark modes will be used to generate molecular optomechanical systems. Prof. Reich published almost 200 research articles, a textbook on carbon nanotubes, and won major awards such as two grants by the European Research Council (ERC). She is the head of the physics department and chair of the Focus Area NanoScale at Freie Universität Berlin. Prof. Reich is the organizer of the Kirchberg Winterschool and Diamond and Carbon Materials, two leading conferences in her research field.

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.