HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

Helmholtz Call for Chinese Applicants Interested in Running for CSC 2021 Fellowship

Helmholtz Centre: Forschungszentrum Jülich GmbH – www.fz-juelich.de

Department/Institute: Institute of Biological Information Processing, Bioelectronics (IBI-3) https://fz-juelich.de/ibi/ibi-3/EN/Home/_node.html

Supervising scientist: Prof. Dr. Svetlana Vitusevich

University for registration or for a future degree: TU Dortmund, Experimental physics II

Research Field: Biophysics

Position open for: **PhD Student X** **Sandwich PhD Student** □

Title of the research: Nanowire field-effect transistor structures studied at external optical excitation for advanced biosensing applications

More description of research topic:

Among different kinds of biosensors silicon nanowire (Si NW) field-effect transistors (FETs) provide real-time label-free detection of biomarkers (analyte) at very small concentrations. Complementary metal-oxide-semiconductor (CMOS) compatibility makes Si NW FETs a cost-efficient and favorable solution for commercial companies. It was already shown that despite traditional sensing approaches, the single-trap phenomena can be regarded as a source of useful information about an analyte. At the same time, the fundamental mechanisms of capture kinetics have not been reported and have to be studied. In particular, quantum effects contributing to dynamic processes near the interface have to be considered. We expect that dynamic processes will be strongly controlled by external optical excitation. NW FETs with different widths down to 60 nm have to be designed and their transport properties have to be studied at external optical excitation using Lasermodul operating in different regimes. The NW FET devices will allow the detection of single charge events. Small biological signals in liquid-gated NW FETs with stochastically driven amplification should be studied. The knowledge represents the basis for the understanding of molecular dynamic processes and the development of new high-performance electronic sensors for the detection of important analytes, including cardiac biomarkers.

Specific requirements:

Master or diploma degree in Physics, Biophysics, Optical Engineering or a related discipline. Strong interest in biophysics are required. The candidate should have prior experience in experimental physics. We are seeking excellent, creative and highly-motivated candidates with very good communication skills enabling them to work in a multidisciplinary team.

Working Place: Forschungszentrum Jülich, Germany (near Cologne)

Earliest Start: September 2021

Language Requirement: Very good knowledge of English language, written and spoken. German language courses are organised in the context of our in-house training program and are free of charge.

Name and Address of the Supervisor: Prof. Dr. S.Vitusevich, Forschungszentrum Juelich, Institute of Biological Information Processing (IBI-3), 52425 Jülich, Germany. E-Mail address: s.vitusevich@fz-juelich.de