



Institute of Physics of the Polish Academy of Sciences

Scholarship for a PhD Student



Job ID: #JOB62/2020

Job Description

Job Title: PhD student – scholarship holder

Job Summary:

MBE growth and characterization of topological crystalline insulator nanowire heterostructures.

Job Description:

The scholarship holder will participate in the realization of the OPUS project: *Radial nanowire heterostructures of topological crystalline insulators with superconductors, ferro- and antiferromagnets*, financed by National Science Centre Poland (NCN). The PhD student will be involved in fabrication and basic characterization of topological crystalline insulators nanostructures (nanowires). The samples will be grown by molecular beam epitaxy (MBE), the relevant materials comprise narrow gap IV-VI semiconductors: PbTe, SnTe, and (Pb,Sn)Te solid solution. The two latter materials are characterized by so called topological protection which results in the occurrence of immune to back-scattering charge carriers at the border of material (surface or edge).

The PhD student tasks will first focus on optimization of the MBE growth of IV-VI semiconductor nanowires in order to obtain nanostructures with desired properties of individual nanowires, such as: structure and crystallographic orientation, diameters (several tens to 100 nm), lengths (one to several micrometers) composition {in the case of (Pb,Sn)Te}. The next step will be to grow core-shell nanowire heterostructures with thin superconducting (Pb), antiferromagnetic (MnTe) and ferromagnetic {(Pb,Sn,Mn)Te} shells grown around (Pb,Sn)Te nanowire cores. He/she will also participate in the characterization of the grown nanostructures with scanning and transmission electron microscopy. As the final task he/she will be involved in contacting selected nanowire heterostructures (with use of lithographical and/or focused ion beam techniques) and magnetotransport measurements, in cooperation with other project contractors.

Requirements:

- Master's degree in physics, materials science or nanotechnology (or an equivalent that qualifies one for PhD studies in physics in the country of issue).
- knowledge of physics of semiconductors
- basic experience in thin film deposition techniques – preferably molecular beam epitaxy
- knowledge of crystallography and physics of nanostructures
- ability to work as a team member and effectively communicate
- good spoken and written English
- passion for experimental physics

- To be employed, the candidate must be accepted into the PhD school in which the Institute of Physics participates. Applications for the position are through recruitment to the School, online at warsaw4phd.eu.

Main research field: Physics

Sub Research Field: condensed matter physics, materials science, nanotechnology

Career Stage: Early stage researcher or 0-4 yrs (Post-graduate)

Research Profile ([details](#)): First Stage Researcher (R1)

Type of Contract: Fixed term (44 months)

Status: Full-time

Salary: grant funding of **5000** PLN per month, before subtracting obligatory employer and employee social security contributions (~15%).

Contact

More information can be obtained from

Dr hab. Janusz Sadowski (e-mail: sadow@ifpan.edu.pl)

Please make contact.

Application details

Application deadline: 5.1.2021 Later applications will not be considered.

Required materials:

- Scientific CV
- Cover letter
- Scan of MSc diploma or equivalent (or an explanation of when one is expected)
- Academic record (for finalized semesters)
- Recommended: A recommendation letter by an academic, or their contact email.

All materials should be submitted in electronic form by application to the PhD school warsaw4phd.eu, choosing the project: " *MBE growth and characterization of topological crystalline insulator nanowire heterostructures*". (The application system will be active from 22 December 2020).

Results regarding the position will be made available by 10 February 2021.