



Institute of Physics of the Polish Academy of Sciences

Scholarship for a PhD Student



Job ID: #JOB 35/2022

Job Description

Job Title: PhD student – scholarship holder

Job Summary:

PbTe/CdTe multilayers, a new material with controlled properties for infrared sensing

Job Description:

The PhD student will take part in the study of CdTe/PbTe heterostructures for their application as infrared detectors. The CdTe/PbTe quantum structures, with PbTe regions forming quantum wells or quantum dots embedded in the CdTe barriers, are known to exhibit very strong photoluminescence resulting from the large difference in the energy band gaps of the both materials. In addition, the both materials show very large contrast in refractive indexes, what makes the CdTe/PbTe material system particularly attractive for construction of photonic crystals. Photonic crystal is a well-defined nano- or microstructure with periodic distribution of refractive index in one, two or three spatial directions. Within CdTe/PbTe heterosystem (using molecular beam epitaxy) it is possible to obtain all of types photonic structure in the form of CdTe/PbTe multilayers (1D photonic crystal), PbTe (CdTe) nanopillars (2D p.c.) and PbTe (CdTe) dots (3D p.c.) embedded in CdTe (PbTe) matrix. Thus, CdTe/PbTe structures are very promising from point of view of potential applications as an infrared detectors and light sources.

The main objective of the proposed project is: to manufacture (with molecular beam epitaxy technique) and investigate (measurements, simulation, optimization) optical (photonic) and electric properties of 2D and 3D CdTe/PbTe structures (building experimental systems and performing measurements) as well as analyzing and presenting obtained data. We expect that the realization of the project will results, among others, in a development of control and integration methods of CdTe/PbTe structures for new kinds of optical devices (in particular infrared detectors) exploiting simultaneously quantum and photonic properties of this semiconductor system.

Requirements:

- experience in solid state physics
- basic knowledge of molecular beam epitaxy technique
- knowledge of optical experimental techniques - particularly in infrared spectral region
- knowledge of written and spoken English
- Master's degree in physics (or an equivalent that qualifies one for PhD studies in physics in the country of issue).
- 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: Optics of semiconductor structures

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

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

Type of Contract: Fixed term (48 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

Michał Szot (e-mail: szot@ifpan.edu.pl)

<http://www.ifpan.edu.pl/SL-3/>,

<http://www.ifpan.edu.pl/ON-1/on1.2/index.php?l=pl&p=home>

Please make contact.

Application details

Application deadline: 10.08.2022 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: "*PbTe/CdTe multilayers, a new material with controlled properties for infrared sensing*". The application system will be active from 27 July 2022.

Results regarding the position will be made available by September 19th, 2022.