Paul-Drude-Institut für Festkörperelektronik (PDI) - https://www.pdi-berlin.de/

Paul-Drude-Institut für Festkörperelektronik

PDI is a research institute in Berlin, Germany. We perform basic and applied research at the nexus of materials science, condensed matter physics, and device engineering.

Lattice dynamics in semiconductors: in-depth study by polarization angle resolved Raman spectroscopy

Master Thesis Topic, Semiconductor Spectroscopy

City: Berlin; Starting date (earliest): At the earliest possible; Duration: 1 year; Remuneration: 13,90€/hour; Closing date: 31/03/26

Tasks

Raman spectroscopy has become a standard in many fields including quality control in the semiconductor or food industries, is widely used for drug or explosives screenings and finds its way into medical applications where e.g. non-invasively skin cancer tests can be carried out without taking tissue samples.
A strength of this method is to be sensitive to the symmetry of materials, i.e. the sample’s (crystallographic)
structure, and hence also be sensitive to changes in this material’s property.
In recent years, we have been developing a method based on quantitative polarization resolved Raman
scattering, capable of accessing the Raman tensor’s relative numeric values, i.e. the respective scattering
intensities – valuable to all investigations of properties including phononic processes (e.g. mechanical
properties, heat transport, phonon mediated (hot) carrier relaxation and optical processes, …)
While this has been attempted previously by other groups, meaningfulness has been questioned as for
some data was not reproducible.
The project is split into two parts: i) to finalize the finetuning of the metrology and develop a measure for its
uncertainty and ii) to investigate different complex oxide-perovskites with chemical formula ABO3, which
can have phase transitions of different order (structural, spin, …). The aim of the second part is to further
the understanding of the material’s microscopic order, leading to macroscopic effects, such as magnetism
or ferroelectricity.
The project will be accompanied by in-house DFT calculations, which may also be

performed in part by the
master’s student.
Student’s Role and Responsibilities:

- Research literature and provide summaries
- Perform diligent measurements and analysis of recorded data

Requirements

Required Qualifications and Skills:

1. Good understanding of solid-state physics (requirement)
2. Sense for details and a precise way working

What we offer

Opportunities and Benefits:

- Access to state-of-the-art facilities and experts in the respective fields to learn from
- Co-authorship of a scientific publication is highly likely
- Mater’s students will be offered a one-year contract

Application

Hans Tornatzky (supervision in German or English)
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More information at https://stellenticket.de/201886/BEUTH/
Offer visible until 26/03/26