

Project 4.7 Rocksalt (MgZn)O alloys and (MgZn)O/MgO quantum structure and their application in deep-ultraviolet light-emitters (theoretical)

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Institute: IF PAN

Unit: ON 4

Background:

ZnO-based materials have important potential industrial and medical applications due to their biocompatibility and biodegradability properties. Due to the low cost of ZnO layers, their high crystal quality and resistance to radiation, the oxides can compete with GaN-based materials. In the far UV range, ZnMgO-based quantum structures crystallizing in rocksalt (RS) structure with an energy gap of 4.2-7.8 eV are promising candidates.

In light emitting diodes or lasers, light emission is tuned by changing the chemical composition of the quantum structure and/or the thickness of its layers, and thus by changing the value of the energy gap. In the project ab-initio studies of materials based on RS-ZnMgO will be performed, taking into account the influence of all microscopic mechanisms on energy gaps.

The aim of the project is to create a theoretical basis for the applications of wide-gap quantum structures in far UV optoelectronics. Quantum structures based on RS-ZnMgO will be examined. Final indications for extending the range of wavelengths emitted in optoelectronic devices towards far UV will be formulated on the basis of theoretical results compared to experiments conducted at the Institute of Physics PAS.

Aim:

Theoretical (ab-initio) studies of materials based on RS-ZnMgO

Requirements:

- 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: Physics of semiconductors
- career Stage: Early stage researcher
- research Profile (details): First Stage Researcher (R1)
- type of Contract: Fixed term (48 months)
- status: Full-time

Funding:

Scholarship: grant funding of 5000 PLN per month, before subtracting obligatory employer and employee social security contributions (~15%), for 36 months. Afterwards, standard Polish PhD scholarship (about 3240 PLN/month net in year 4).

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