

Project 4.15. Quantum structures based on CdMgO and ZnCdO superlattices and random alloys.

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Unit: Division of Physics and Technology of Wide-Band-Gap Semiconductor Nanostructures. Group of MBE Growth of oxide Nanostructures.

Background:

The search for new transparent materials, which will additionally have high carrier mobility and low resistivity, is interesting for new optoelectronic applications including solar cells. The use of non-equilibrium growth method: molecular beam epitaxy (MBE) allows them to be made in the field of compositions and structures in which they do not crystallize in a natural way. This technique also allows the creation of structures with reduced dimensionality, i.e. quantum wells.

Aim:

The aim of this project is to study ternary CdMgO and ZnCdO oxides which are extremely interesting from the point of view of their application in transparent electronics. In these materials, by manipulating the content of Mg or Cd, we can significantly change the energy gap from 2.2 eV to the far UV region. The manipulation with energy gap allows to perform quantum structures including quantum-wells, multi-quantum-wells and super-lattices. It is planned to obtain these structures by applying Molecular Beam Epitaxy (MBE) method. The electrical and optical tests carried out as part of the project will allow for the extensive characterization of these ternary oxides. The influence of doping on the properties of oxide films will also be the subject of this project.

Requirements:

- Master's degree in Physics or related, knowledge of English, interest in solid state physics and experimental physics.