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Short-range In-segregation in InGaN and InAlN. Band structure and light emission related effects.

Prof. Tadek Suski

时间：10月25日（星期四）15:00—16:40
地点：北京大学物理楼中212教室

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Abstract: GaN and its alloys with Al and In recently became the basic materials for short-wavelength optoelectronics. This is mainly due to their direct energy gaps covering the whole visible spectrum and a large part of the UV range. At present, high brightness blue and green light emitting diodes (LEDS) and near UV-blue laser diodes (LDs) are commercially available. In the first part of the seminar I will concentrate on a phenomenon of In-segregation in InGaN and InAlN ternary alloys which form Quantum Wells of epitaxially grown nitride emitters. It represents a commonly observed effect leading to spectacular features of the described structures. Ab-initio calculations of the band structure modifications caused by In-segregation will be presented and compared with optical experiments performed on InGaN and InAlN ternary alloys. Since using lattice-mismatched substrates other then GaN single crystals, significantly enhances tendencies to In-segregation, in the second part of the seminar I will discuss, why obtaining large, high quality GaN crystals is very difficult. This is a direct consequence of thermodynamical properties of GaN. Two high pressure methods (High Nitrogen Pressure Synthesis of GaN from Liquid Gallium (HPSN) and Ammonothermal Growth enabling producing the highest quality GaN crystals will be presented.

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