

PHYSICAL COLLOQUIUM
INVITATION

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speaks

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about

**Group III-Nitride Nanostructures: Model systems for physical
properties and photoactivated chemical sensors**

Group III-nitride (III-N) nanowires (NWs) and nanowire heterostructures (NWHs) are a topic of intense current research. Part of these activities are motivated by the possibility of realizing novel, nanoscaled optoelectronic devices with improved stability and efficiency or the perspective of improving electronic devices due to the low density of structural defects. For the latter reason NWHs also present an excellent model systems to analyze basic physical properties of confined systems and for the influence of internal electric fields in their optical properties.

Here, we report on the optical properties of complex GaN/AlN NW heterostructures grown by plasma-assisted molecular beam epitaxy. We show that in axial NWHs internal electric fields both in axial and lateral direction strongly influence the recombination dynamics and can be controlled by adjusting the NWH geometry and by electrostatic screening due to controlled doping. We demonstrate that on a single NW level the internal electric fields can be probed and the emission properties can be manipulated by application of an external bias and hence the superposition of an external electric field.

Furthermore, we demonstrate that GaN NWs and InGaN/GaN NWHs also present an excellent platform for the realization of photoactivated chemical and photoelectrochemical sensors. The analysis of the complex adsorption behavior of water on InGaN/GaN NWHs by monitoring of their photoluminescence properties is discussed and the spatial resolved detection of biochemical processes as well as the realization of photo-electrochemical biosensors is shown.

All interested persons are cordially invited.

Sgd. Prof. Christoph Lienau