

Dr. Martin Strassburg
 OSRAM
 Opto Semiconductors GmbH
 Regensburg



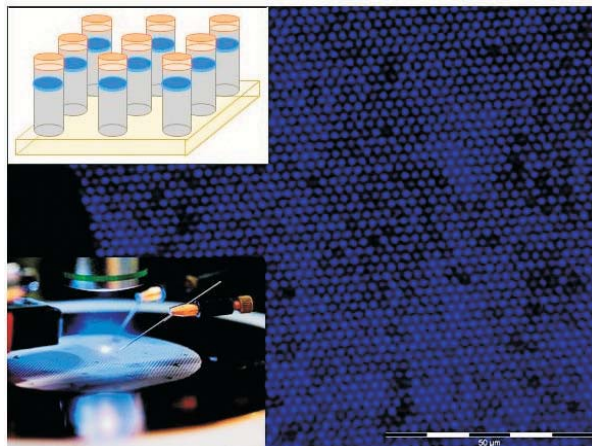
InGaN Nanostructures: Pathway to Novel 3D LEDs

physikalisches

Mo.6.2.2012
 16:15 Uhr
 Ort: H 34

Novel 3D LEDs have the potential to overcome several performance limiting issues in today's LED technology, such as the so-called brightness droop at elevated currents and reduced temperature stability at operation conditions. These 3D LEDs are realized by position-controlled grown InGaN nano- and microstructures. Their small lateral dimensions lead to strain relaxation which allow for higher Indium-contents in the active layers. This leads to longer emission wavelengths, while a very high material quality is maintained.

Core-shell nanorods enable significantly enlarged active areas and thus increase the total light output. The improved luminous efficiency results from a reduction of current densities compared to planar structures at the same operation point. Additionally, the nanorod dimensions in the order of the emission wavelength cause unique optical properties which can be applied to control the extraction and directionality of light. The potential increase in internal and external quantum efficiency of core-shell based devices is simulated considering photon recycling in non-polar emitter and absorption in the applied current spreading layer.



Electroluminescence from an array of nanorods fabricated in the top-down approach