



Seminarankündigung

Dienstag, 23. November 2010

17:15 Uhr

WSI, Seminarraum S 101

“III-V semiconductor nanowires for optoelectronics”

Heteroepitaxy in the form of nanowires enables the combination of dissimilar materials in high material quality, because any structural mismatch between adsorbate and substrate can more easily be accommodated than in planar structures. This advantage can be made use of for the monolithic integration of III-V semiconductors on Si substrates with the vision to achieve efficient light emission on a Si platform. Also, the coupling of light into and out of nanowires is expected to differ substantially from the case of layers, which may enable higher external quantum efficiencies of optoelectronic devices. Another benefit of nanowires is that complex structures can be fabricated by an appropriate sequence of growth steps, resulting in nanodevices based on single nanowires. We employ molecular-beam epitaxy (MBE) for the growth of III-As and III-N nanowires. Progress towards the vision sketched above requires research on many fundamental aspects. The following topics will be addressed in this presentation: First, nucleation phenomena determine important nanowire properties like the position and the initial diameter. Second, for different approaches to the growth of nanowires the resulting material quality is evaluated. Third, a very obvious difference between planar semiconductor structures and nanowires is the extremely high surface-to-volume ratio of the latter, which significantly affects the nanowire properties. Fourth, knowledge about impurity incorporation and doping cannot easily be transferred from the planar to the nanowire case. Finally, an outlook on the formation of heterostructures in nanowires is given.

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