



Colloquium Announcement

of the Collaborative Research Centre 951

“Hybrid Inorganic/Organic Systems for Opto-Electronics”

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Semiconductor nanowires for 3D nano-LEDs and hybrid optoelectronic devices

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Structural and electronic properties of transition metal dichalcogenide monolayers

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Room 0`119.



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Semiconductor nanowires for 3D nano-LEDs and hybrid optoelectronic devices

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Semiconductor nanowires represent a particularly interesting platform for the design and fabrication of nanoscale inorganic and hybrid devices with applications in optoelectronics and sensing. Their unique properties are largely determined by their large surface-to-volume ratio combined with a high crystalline quality and the naturally formed electronic or photonic transport channels.

In this presentation, we will discuss the design and characterization of different GaN- and ZnO-based nanowire devices. We will show the design and analysis of 3D GaN-based micro- and nano-LEDs and in particular discuss the recombination dynamics of electron-hole pairs after photo-excitation. We will further demonstrate the fabrication of hybrid ZnO/Polypyrrole and GaN/PEDOT core-shell nanowires for nano-LED applications using the oxidative chemical vapor deposition (oCVD) process for conductive polymers.

For sensing applications, nanowires functionalized with colloidal nanocrystals and Carbon nanodots (CDots) through organic linker molecules constitute a promising platform. We will study the role of surface oxygen for the dynamics of the electron transfer processes between the nanocrystals and the nanowires and discuss the role of different linker molecules.