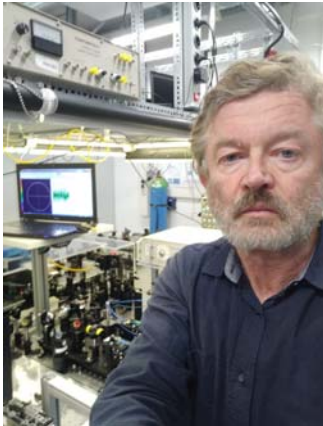




TECHNISCHE UNIVERSITÄT
CHEMNITZ

Institut für Physik Physikalisches Kolloquium

- Online-Veranstaltung -



Mittwoch, 12.01.2022, um 11:15 Uhr

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Berlin

Spectroscopic studies of GaN-based devices

An overview is given of spectroscopic work on GaN-based diode lasers carried out in the "Optoelectronic Devices" group at MBI in recent years starting in 2014. This concerns in particular analytical approaches, especially using time-resolved spectroscopy, as well as investigations of the aging behavior, sudden and also gradual, of such devices.

The catastrophic optical damage (COD) at semiconductor lasers has been of interest to us for a long time, originally starting with GaAs-based devices. It was then interesting for us to investigate in particular its kinetics also at GaN-based diode lasers and to compare the results with those obtained at GaAs-based devices to understand the relevant mechanisms. To study the kinetics, we have developed a method in which the COD is artificially provoked in sub- μ s single current pulses that are increased stepwise. This makes it possible to temporally resolve both pre-stages, the "hot" process itself, and subsequent defect propagation in the device. We present such scenarios, which have been observed on both fresh and artificially pre-damaged devices.

Further results refer to the gradual aging of quantum wells, the centerpiece in the optically active region of GaN-based emitters. We demonstrate in accelerated aging experiments that the lifetime of the non-equilibrium carriers in the quantum well gradually decreases with operation time. In addition, the emission in the quantum well also dehomogenizes spatially (laterally). Both effects, lifetime reduction and dehomogenization, contribute significantly to the gradual power decrease of GaN-based devices.

The presented work is also an example of how spectroscopic techniques known from basic research can help to advance the physical understanding of very practical questions on devices.



Informationen zum Vortrag erteilt:

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