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UNIVERSITÄT BERN

Seminar über Biomedizinische Photonik

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Titel: Depth control of room temperature single-photon emitters in gallium nitride

Bright quantum emitters are key components for quantum communication systems. Radiative point defects in gallium nitride (GaN) are promising candidates for room temperature single-photon emission across visible, near-infrared (NIR), and telecommunication wavelengths. Due to its widespread use for solid-state lighting, GaN is an extensively studied material which gives these single photon emitters an advantage for future applications. Here, we focus on visible and NIR emitters which exhibit narrow linewidths around 4 nm, photon count rates exceeding 1 MHz and single-photon purities reaching 94%. Despite their potential, previous attempts to integrate these emitters into photonic structures have yielded photon extraction efficiencies much below simulated values. This work focuses on identifying the formation mechanism of these point defects. We show that defects in GaN grown on sapphire are located in the vicinity of the substrate, a detrimental result to obtain high coupling efficiencies with photonic structures due to an inadequate position in depth. To address this issue, we present an epitaxial growth method enabling defect generation at any chosen depth with over 50 nm accuracy. The defect introduction is substrate-independent, generating defects even in samples grown on freestanding GaN. These developments represent an essential milestone toward efficient emitter-cavity coupling, enabling the realization of cavity-enhanced single-photon emission in GaN.

Zeit: Wednesday March 18, 2026 10:15 Uhr

Ort: Room A97, ExWi, Sidlerstrasse 5, 3012 Bern