Hybrid Inorganic/Organic Systems for Opto-Electronics

Collaborative Research Centre 951

Colloquium Announcement

of the Collaborative Research Centre 951
"Hybrid Inorganic/Organic Systems for Opto-Electronics"

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Quantum Emitters in Flatland

Time: Thursday, July 19, 2018, 3 pm c.t.

Place: IRIS Adlershof, Zum Großen Windkanal 6, 12489 Berlin, Room 007

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Quantum Emitters in Flatland

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Engineering solid state quantum systems is amongst grand challenges in engineering quantum information processing systems. While several 3D systems (such as diamond, silicon carbide, zinc oxide) have been thoroughly studied, solid state emitters in two dimensional (2D) materials are only just emerging.

In this talk I will discuss single photon emitters in 2D hexagonal boron nitride (hBN). I will present several avenues to engineer these emitters in large exfoliated sheets using ion and electron beam techniques. I will also discuss potential atomistic structures of the defects supported by density functional theory. In the second part of the talk I will describe avenues to tune the emission properties of hBN defects and promising avenues to deterministically engineer them on demand.

The formed emitters in 2D hBN flakes have extremely promising properties – including high brightness (~ millions counts/s), stability up to high temperatuers and linear polarization at excitation and absorption. Those properties make these emitters extremely attractive for their integration with optical resonators and waveguides. I will show preliminary results on plasmonic enhancement and integration with nanophotonics resonators. Finally, I will discuss several challenges and promising directions in the field of quantum emitters and nanophotonics with 2D materials and other wide band gap materials.