HL 51: Invited Talk Gregor Koblmüller

Time: Tuesday 14:00–14:30 Location: POT 112

Invited Talk HL 51.1 Tue 14:00 POT 112

Advanced optical properties of (In,Ga)As nanowire heterostructures — •Gregor Koblmueller — Walter Schottky Institut, Technische Universität München, Garching, Germany

In this talk, we focus on our most recent results on the growth and fundamental understanding of the physical properties of (In,Ga)As-based NWs as fabricated on Si, and further highlight advanced optical emitters tunable from the infrared to the THz regime. First, I will describe routes for completely catalyst-free (In,Ga)As NWs on Si (111), grown via (i) self-assembled and (ii) more sophisticated selective-area epitaxy (SAE) schemes. Based on the growth, several unique structural properties (such as wurtzite phase in the commonly cubic arsenides) will be highlighted and distinct structure-electronic function relationships (such as crystal-phase dependent band gap, radial quantum confinement, etc.) elucidated. In the second part, the optical emission characteristics will be explored based on advanced core-shell NW concepts of InAs-InAsP and GaAs-AlGaAs core-shell NWs. For both core-shell NW systems we demonstrate significant enhancements (˜100-1000-fold) in the photoluminescence efficiency via suppression of surface states and carrier confinement. Furthermore, based on the GaAs-AlGaAs core-shell NW heterostructures we report very efficient resonators that enable even lasing operation at room-temperature. Finally, we show that InAs NWs can be also utilized as very strong THz emitters with record high THz radiation efficiencies that are >3x stronger than p-type bulk InAs, currently the best semiconductor THz emitter.