HL 3: Invited Talk Sebald

Time: Monday 10:00–10:45 Location: H15

Invited Talk HL 3.1 Mon 10:00 H15

Wide-bandgap quantum dot based microcavity VCSEL structures — •K. Sebald[1], H. Lohmeyer[1], J. Gutowski[1], C. Kruse[1], R. Kröger[1], T. Yamaguchi[1], A. Gust[1], D. Hommel[1], J. Wiersig[2], and F. Jahnke[2] — [1]Institute of Solid State Physics — [2]Institute of Theoretical Physics, University of Bremen, P. O. Box 330440, Germany

Embedding semiconductor quantum dots (QDs) in solid state microcavities is promising for a variety of classical and quantum-optical devices leading to improved properties and new applications. By utilization of the selenide and nitride wide-bandgap system devices for the UV to green spectral region can be realized. Furthermore, QDs being formed on base of these material systems are characterised by a high temperature stability of their emission making them good candidates for operation at elevated temperatures. In this contribution we report on the optical properties of planar and pillar structured GaN- and ZnSe-based monolithic microcavities [1]. The latter reveal three-dimensional confined optical modes with high quality factors and potentially small mode volumes. The measured data are discussed with regard to theoretical calculations. Furthermore, the optical emission properties of CdSe QDs embedded into microcavities have been studied [2]. The Purcell effect is indicated to occur by the pronounced enhancement of the spontaneous emission rate of QDs coupling to the discrete optical modes of the cavities. This enhancement depends systematically on the pillar diameter and thus on the Purcell factor of the individual pillars. [1] H. Lohmeyer et al., Appl. Phys. Lett. 88, 051101 (2006). [2] H. Lohmeyer et al., Appl. Phys. Lett. 89, 091107 (2006).