Preface

During 2008, the research activities of the Institute of Optoelectronics have been continuing in the areas of optical interconnect systems, vertical-cavity surface-emitting lasers, GaN-based electronic and optoelectronic devices, and high-power optically pumped semiconductor disk lasers.

Current research topics of the VCSELs and Optical Interconnects Group are vertical-cavity lasers with polarization-stable light output, fundamental or higher-order mode selection, one-dimensional and matrix-addressable two-dimensional arrays as well as bidirectional interconnect solutions and optical microparticle trapping for biophotonics. Record-high single-mode powers have been obtained from a monolithic VCSEL with a curved output reflector. For the first time, hybrid integration of VCSEL arrays and microfluidic chips has been demonstrated.

The GaN group has put more and more efforts on the research towards non- and semipolar GaN. Funded by the Deutsche Forschungsgemeinschaft, a transregional research group project could be launched where eight German groups jointly concentrate their efforts for coming closer to a green laser diode based on such materials, co-ordinated by us. Hence, our ongoing work on facet LEDs and the successful fabrication of a polar ultra-violet GaInN laser diode set excellent corner stones for such work. On the other hand, our research now also targets the other spectral direction towards short-wavelength LEDs.

In the High-Power Semiconductor Laser Group, optically pumped semiconductor disk lasers have been further improved. Our devices show the highest absorption efficiencies, conversion efficiencies, and differential quantum efficiencies which have been reported so far.

Five members of the Institute, namely Peter Brückner, Frank Demaria, Barbara Neubert, Fernando Rinaldi, and Daniel Supper received their Ph.D. degrees. Furthermore, four Diploma Theses, six Master Theses, one Bachelor Thesis, and two Semester Projects have been carried out in 2008. In July 2008, Alexander Kern's Diploma Thesis on frequency-doubled semiconductor disk lasers was awarded by the VDI, and Johannes Michael Ostermann received the Dissertation Award of Ulm University for his thesis on surface grating VCSELs. In the same month, Rainer Michalzik had submitted his Habilitation Thesis. The procedure was concluded with a scientific presentation given in Feb. 2009.

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