Preface

In the year 2013, the three research groups of the Institute of Optoelectronics fruitfully continued their projects on vertical-cavity surface-emitting lasers (VCSELs) and systems, GaN-based optoelectronic devices, and semiconductor disk lasers. Results have been published extensively. Moreover, a number of students have completed their theses, as listed in the rear part of this Report.

The VCSELs and Optical Interconnects Group has brought its project on microfluidic-integrated particle sorting systems based on custom-designed laser arrays to a successful end. A new generation of Ph.D. students was hired and current projects focus on high-speed lasers for optical interconnect applications and novel VCSEL designs. The new VCSEL book edited by Rainer Michalzik was received well by the scientific community.

Studies of the GaN group continued to concentrate on semipolar heterostructures. A big step forward to sub-micrometer structured facet light emitting devices was done by implementing nano-imprint as a novel, simple lithographic technology. On the other hand, planar semipolar structures on patterned sapphire wafers could be significantly improved. First steps towards N-polar GaN helped to establish the direct growth of coaxial GaN-GaInN nano-structures without ZnO templates.

In the High-Power Semiconductor Laser Group, an optically-pumped semiconductor disk laser has been further improved, generating an output power of 25 W at the fundamental wavelength of 1040 nm. The frequency-doubled output power exceeds 11 W and shows an overall power conversion efficiency of nearly 25 % at 519 nm wavelength. Moreover, a laser system for optical trapping experiments on the barium ion, requiring high-power, stable single-frequency operation, and a narrow spectral linewidth, was realized in collaboration with the Institute of Quantum Matter.

During the Open Day of the Faculty on Nov. 7, the Institute presented a rich selection of research samples and cleanroom tours were offered to the interested public.

Rainer Michalzik
Ferdinand Scholz
Peter Unger Ulm, March 2014