
Kolloquium Lasertechnik

Gastvortrag

Laser Doping of silicon carbide for White Light-Emitting Diodes

Vortragender:	Prof. Dr. Aravinda Kar University of Central Florida, Florida
Datum:	Donnerstag, 10.07.2008
Uhrzeit:	17.00 Uhr
Ort:	ILT Aachen, Schulungsraum

This talk will present a laser doping process and its application for photonics device fabrication, particularly light emitting diodes. Thermal analysis and dopant diffusion modeling are used to ensure dopant incorporation without any thermal damage to the crystalline substrate. Fabrication of white light-emitting (LED) diodes in SiC substrates of both 4H-SiC and 6H-SiC polytypes using the laser doping process will be demonstrated. In spite of having an indirect bandgap, SiC is potentially an excellent semiconductor for white LED based on the donor acceptor pair (DAP) recombination mechanism. Laser-doped Cr and Al behave as acceptors in SiC while N behaves as a donor. As opposed to the existing epilayer-based multilayer semiconductors which emit different colors to from pure white light, the SiC device is an LED embedded in a single chip, a ~ 450 micron thick SiC substrate, which emits pure white light. Very good color rendering index (96-98%) and color-coordinated (5338-5510 K) have been obtained for SiC LEDs that compare well with pure white light for which the color-coordinated temperature is 5500 K.