Hessisches Kompetenzzentrum
für Hochleistungsrechnen

Advanced Electro-Optical Modeling of III-Nitride Light Emitters

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Project Areas
Optics, Quantum Optics and Physics of Atoms, Molecules and Plasmas

Clusters
Linux Cluster Kassel

Institute
Center for Interdisciplinary Nanostructure Science and Technology

University
University Kassel

Introduction

As part of the research group POLARCON, we intend to study the active region carrier dynamics in III-nitride light emitting devices using quantummechancal non-equilibrium models, such as an empirical scattering theory or the non-equilibrium Green‘s function method (NEGF). This method is applied to the analysis of active regions for III-nitride light emitters with different crystals orientations for the first time. It will overcome the limits of present simulation methods, such as lack of tunneling currents and thermally activated currents from non-equilibrium carrier distributions in the prescence of radiative and non-radiative recombination. Using this model, we plan to improve the understanding of lasers and light emitting diodes (LEDs) for polar, semi-polar and non-polar configurations, in particular electro-optical efficiencies and threshhold current densities.

Reference

[1] B. Witzigmann (invited), Non-Equilibrium Green‘s Functions for Optoelectronics, CECAM workshop on empirical methods in semiconductor nano-structures design and modelling, June 21-25 2010, Manchester, UK.

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