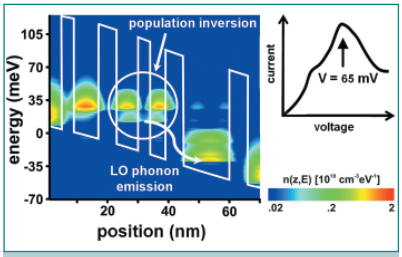
nextnano³ semiconductor software solutions

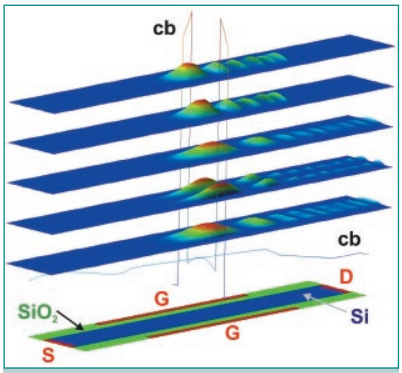
Software for the simulation of electronic and optoelectronic semiconductor nanodevices and materials

nextnano³, a spin-off of the Theoretical Semiconductor Physics group of the Walter Schottky Institute (Technische Universität München), develops software for the simulation of electronic and optoelectronic semiconductor devices. The company focuses on the implementation of recent state-of-the-art research results in the field of semiconductor nanotechnology into software solutions, as well as on the customer specific modeling of semiconductor nanodevices.

Due to the continuing downscaling of semiconductor electronics, quantum physical effects are gaining importance and confront the industry with fundamental challenges with respect to simulation and design. The nextnano³-software calculates the quantum mechanical properties of an arbitrary combination of geometries and materials, i.e. the software is not predetermined for certain types of devices and thus perfectly suited for both, currently existing devices (e.g. MOSFET) and novel devices like for instance DNA sensors or components of a solid state quantum computer (qubit). The applications of the nextnano³-software are very versatile with respect to types of devices (e.g. transistors, LEDs, lasers, detectors, bio chips, solar cells) and materials (e.g. silicon germanium, compound semiconductors like InGaN or AlGaInP, organic semiconductors, exotic materials like graphene which corresponds to an atomic monolayer of graphite and many others). Due to this flexibility, universities and research laboratories are among the international clientele. By means of simulations (variations of the geometries and materials) the properties of the devices can be optimized already in the planning stage. In the future markets of spintronics, quantum computing, quantum cryptography, nanowires, quantum dots, bio chips etc., it is crucial to have - in advance - a thorough understanding of the quantum physical, electronic, optical, chemical and biological processes. ■



Energy resolved distribution of electron density and conduction band profile of a THz AlGaAs/GaAs quantum cascade laser at an applied bias of 65 mV, i.e. during the emission of light. The population inversion is clearly visible, i.e. there are many electrons with higher energies that scatter to lower energy levels by emitting light.
(T. Kubis, Walter Schottky Institute) ■



Electron wavefunctions of a Double Gate MOSFET (gate length 25 nm, channel width 5 nm) and cross sections through the conduction band profile (cb). The applied bias at the two gates (G) controls the current flow of the electrons from source (S) to drain (D) ■

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