HL 27 Störstellen / Amorphe Halbleiter

Zeit: Samstag 12:45–13:15 Raum: TU P-N226

HL 27.1 Sa 12:45 TU P-N226

Ab-initio Study of the Diffusion of Gallium and Arsenic in Silicon — •Ralf Meyer, Michel Côté, Laurent J. Lewis, and Normand Mousseau — Département de physique, Université de Montréal, C.P. 6128 succ. Centre-Ville, Montréal (Québec) H3C 3J7, Canada

We report results of ab initio calculations of the diffusion of Ga and As in crystalline silicon. In the first part of our work we have studied the possible defect configurations of the diffusing atoms in the crystal lattice. In order to do this, we have performed ab initio total-energy calculations based on the pseudopotential approach and the local density approximation with a planewave basis set. In the second part of our study, we have determined possible diffusion paths of the defect atoms in the silicon matrix. Here, we have employed the activation relaxation technique [1] in combination with the self-consistent charge density functional tight-binding method [2] for the calculation of energies and forces.

[1] N. Mousseau and G. T. Barkema, Phys. Rev. Lett. **77**, 4358 (1996).
[2] M. Elstner et al., Phys. Rev. B **58**, 7260 (1998).

HL 27.2 Sa 13:00 TU P-N226

Charge trapping in SiO2 layers implanted with rare earths and Ge ions — •Slawomir Prucnal[1], Jiaming Sun[2], Xiangqian Cheng[3], and Wolfgang Skorupa[4] — [1]s.prucnal@fz-rossendorf.de — [2]J.Sun@fz-rossendorf.de — [3]xqcheng@fz-rossendorf.de — [4]w.skorupa@fz-rossendorf.de

Metal-oxide-silicon (MOS) structures containing different rare earth and germanium ions exhibit strong luminescence from 300 to 1540 nm. It is very interesting from the viewpoint of the formation of silicon-based light-emitting devices. The different behaviour of charge trapping in Ge, Tb, Gd and Eu enriched SiO2 layer was studied under constant current regime. High-frequency (100 kHz) capacitors-voltage (C-V) characteristics exhibit a strong dependence of the charge trapping on the type of elements implanted into the SiO2 layer. The increase of the Eu concentration up to 3 percent leads to a shift of the C-V characteristics towards negative voltage in comparison with fresh samples, which reveals positive charge trapping. The capture cross section and the concentration of the different type of charge traps can also be strongly influenced by changing the annealing temperature and annealing time.