HL 40: SiC

Time: Thursday 12:30–13:00 Location: H15

HL 40.1 Thu 12:30 H15

Space-charge waves in SiC — •Michaela Lemmer[1], Mirco Imlau[1], Manfred Wöhlecke[1], Mikhail Petrov[2], and Valeriy Bryksin[2] — [1]Department of Physics, University of Osnabrück, Germany — [2]Ioffe Physico-Technical Institute, St.

The phenomenon of space-charge waves (SCW) is comprehensively studied in the field of nonlinear optics. SCW are eigenmodes of spatial-temporal oscillations of a space-charge density appearing in semi-insulating materials in an external electric field. The behaviour of low-frequency SCW, like those found in SiC, depends on the defect structure of the investigated material. As the defect structure in SiC is a promising scientific topic, we apply the method of resonant SCW excitation to a 4H-SiC polytype.

In this case, SCW are excited with an oscillating interference pattern and an externally applied electric field of $0 < E_0 \leq 10$ kV/cm. If the frequency of the interference pattern coincides with the eigenfrequency of the SCW mode, resonant excitation occurs. Because of a relatively low trap concentration in SiC, causing the effect of trap saturation, the general theory has to be modified. With this assumption, all results are found in a good agreement with the theoretical concept. This allows to determine important material parameters of 4H-SiC like the product of mobility and lifetime of the charge carriers $\mu\tau = (7.4 \pm 0.8) \cdot 10^{-7}$ cm^2/V, the Maxwell relaxation time $\tau_M = (5.3 \pm 0.6) \cdot 10^{-4}$ s, and the effective trap concentration $N_{\text{eff}} = (5 \pm 1) \cdot 10^{13}$ cm^{-3}.

Supported by the Deutsche Forschungsgemeinschaft (DFG, projects GRK 695 and 436 RUS 17/15/07).

HL 40.2 Thu 12:45 H15

Biofunctionalization of Silicon Carbide — •Marco Hoeb[1], Sebastian Schoell[1], Martin Huth[2], Bert Nickel[2], Martin Stutzmann[1], Martin Eickhoff[1], and Martin S. Brandt[1] — [1]Walter Schottky Institut, Technische Universität München, Am Coulombwall 3, 85748 Garching, Germany — [2]Department für Physik, Ludwig-Maximilians-Universität München, Geschwister-Scholl-Platz 1, 80539 München, Germany

SiC is an attractive semiconductor for biosensor applications, because of its large bandgap and superior stability. However, the SiC-surface chemistry in particular with respect to the covalent attachment of organic molecules has remained largely unexplored. We have investigated the functionalization of n-type 6H-SiC via silanization (APTES), where molecules are bound to a hydroxylated surface. The chemical, structural, and electronic properties of functionalized SiC were investigated on both the Si-terminated (0001) and the C-terminated $(000\bar{1})$ surface, using contact angle, AFM, fluorescence microscopy, XPS, thermal desorption spectroscopy (TDS), SAXS, and current-voltage measurements. Our data indicate a covalent attachment of the organosilane molecules to both the Si- and the C-terminated surface. A homogeneous coverage with active functional amino end groups was demonstrated via fluorescence micropatterning. However, SAXS and TDS suggest a lower average surface coverage on the C-terminated compared to the Si-terminated surface.