DF 10: Dielectric surfaces and interfaces

Time: Wednesday 9:30–10:30 Location: GER 37

DF 10.1 Wed 9:30 GER 37

Aligned deposition of λ-DNA on $LiNbO_3$ substrates by means of Ferroelectric Lithography — •Saminathan Ramakrishnan, Alexander Haussmann, and Lukas Eng — Institut für Angewandte Photophysik, TU Dresden, Dresden, Germany.

We report on the controlled deposition of λ-DNA to domain walls (DWs) of 5 mol.% Mg doped congruent $LiNbO_3$. Firstly, DWs were photochemically decorated with Au nanoparticles serving as pinning points to graft the DNA molecules [1]. Subsequently,these pin points were functionalized with 1,6-hexanedithiol, thus providing free reactive thiol groups at the Au surface. Incubation of fluorescently (YOYO-1) labeled λ-DNA followed by an intensive washing with a buffer solution that finally resulted in single DNA molecules that bridge the gaps between the aforementioned pin points. The analysis of these multi-component nanostructures and the underlying domain pattern was carried out by means of optical fluorescence microscopy, dynamic mode scanning force microscopy, and piezoresponse microscopy.

[1] A. Haußmann et al., Nano Lett. 9, 763 (2009)

DF 10.2 Wed 9:50 GER 37

Exploring contact charging of single crystalline dielectrics by atomic force microscopy — •Monika Mirkowska[1,2], Markus Kratzer[2], Stefan Klima[1,2], Helmut Flachberger[1], and Christian Teichert[2] — [1]Chair of Mineral Processing, Department Mineral Resources and Petroleum Engineering, Montanuniversität Leoben, Austria — [2]Institute of Physics, Montanuniversität Leoben, Austria

The electrostatic charging of surfaces is successfully applied in the triboelectrostatic separation of mineral particles. However, the knowledge about the charge exchange during the insulator-insulator contact is still limited. Here, we study the electric charging of well-defined dielectric surfaces (quartz and calcite single crystals) upon contact with conventional atomic force microscopy (AFM) probes and with micrometer sized single calcite particles attached to the end of commercially available AFM cantilevers. We examined the effect of different contact types like static contact, point charging, and rubbing on the charging. A combination of contact mode atomic force microscopy (for charging) and Kelvin probe force microscopy was applied in order to verify the local electrostatic potentials of the surfaces before and after charging. Special attention was put on the influence of humidity (adsorbed water layer), contact time and load force on the charge transfer.

DF 10.3 Wed 10:10 GER 37

Dielectric screening of surface states in a topological insulator — •James LeBlanc[1] and Jules Carbotte[2] — [1]Max-Planck Institute for the Physics of Complex Systems, Dresden DE — [2]McMaster University, Hamilton Canada

Hexagonal warping provides an anisotropy to the dispersion curves of the helical Dirac fermions that exist at the surface of a topological insulator. We show how modifications to the Dirac spectrum by inclusion of hexagonal warping, as well as a Schrödinger and gap term modify the polarization function of the surface states. We derive in the long wavelength limit the plasmon dispersion and show that it obtains a weak dependence on the direction of scattering momentum, q. Further, we show numerically the plasmon dispersions at large q and find considerable directional anisotropy of the plasmon bands in comparison to the pure Dirac plasmons.