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S E M I N A R
aus
Halbleiterphysik und Nanotechnologie

Di, 19.1.2016, 11:00 Uhr, Hörsaal für Physik

"Understanding Opto-Electronic Properties of Diamond Nanoparticles by Scanning Probe Methods"

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Diamond nanoparticles, often denoted as nanodiamonds (NDs), represent a novel carbon-based nanomaterial with features that are considered promising for applications ranging from biomedicine to spintronics. The use of NDs for photovoltaic applications remains largely unexplored though. We will present our novel methodology how to reliably characterize electrical potential and consequently photovoltage of nanodiamonds by atomic force microscopy and Kelvin probe force microscopy. We will compare effects of surface modifications by oxygen and hydrogen on microscopic electrical potential and current. We will show impact of the surface interactions and charge localizations on electron and light emission from the nanoparticles as well as on photodiodes with embedded nanodiamonds. For reference see e.g. our recent works:

S. Stehlik, L. Ondic, A. M. Berhane, I. Aharonovich, H. A. Girard, J. C. Arnault, B. Rezek: ***Photoluminescence of nanodiamonds influenced by charge transfer from silicon and metal substrates,*** Diam. Relat. Mater. (2015) doi:10.1016/j.diamond.2015.08.009

S. Stehlik, T. Petit, H. A. Girard, J.-C. Arnault, A. Kromka, B. Rezek: ***Surface-modified diamond and gold nanoparticles exchange charge and switch polarity with substrates,*** J. Nanopart. Res. 16 (2014) 2364-2374.

S. Stehlik, T. Petit, H. A. Girard, J.C. Arnault, A. Kromka, B. Rezek: ***Nanoparticles assume electrical potential according to substrate, size and surface termination,*** Langmuir 29 (2013) 1634-1641.

S. Stehlik, M. Varga, M. Ledinsky, V. Jirasek, A. Artemenko, H. Kozak, L. Ondič, V. Skakalova, G. Argentero, T. Pennycook, J. Meyer, A. Fejfar, A. Kromka, B. Rezek: ***Size and purity control of HPHT nanodiamonds down to 1 nm,*** J. Phys. Chem. C 119 (2015) 27708–27720.