

MAR11-2010-008649

Abstract for an Invited Paper
for the MAR11 Meeting of
the American Physical Society

Electroluminescence from a single nanotube-molecule-nanotube junction

RALPH KRUPKE, Karlsruhe Institut für Technologie

The reliable fabrication of metallic singlewall carbon nanotube (mSWNT) electrode pairs with sub-10 nm spacing allows us to contact organic molecules (M) via dielectrophoresis and to form mSWNT-M-mSWNT junctions. For this purpose we used specific designed molecules which have an appropriate length to bridge the SWNT electrode gap, and a sufficient polarizability to allow the molecule deposition between the SWNT electrodes via DC-dielectrophoresis. The molecules comprise a fluorescent chromophore subunit. During transport measurements several mSWNT-M-mSWNT junctions showed light emission at voltages > 4 V. The electroluminescence spectrum from the junction is very similar to the photoluminescence signal of the molecules on HOPG-surfaces. This result together with control experiments indicates that light is emitted from the chromophore core of the mSWNT contacted molecule [1]. If time allows I will also report on a related work about phonon-assisted electroluminescence from biased metallic single wall carbon nanotubes (SWNT), multi wall carbon nanotube (MWNT) and few layer graphene (FLG) devices [2].

[1] C.W. Marquardt, S. Grunder, A. Blaszczyk, S. Dehm, F. Hennrich, H. v. Löhneysen, M. Mayor, R. Krupke, Nature Nanotechnology 2010; DOI: 10.1038/NNANO.2010.230

[2] S. Essig et al., Nano Letters 10, 1589 (2010)