Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Nm-resolution studies of Au/molecular-film/GaAs junctions using ballistic electron emission microscopy (BEEM) C. MARGINEAN, C. TIVARUS, J.P. PELZ, The Ohio State University, HOSSAM HAICK, DAVID CAHEN, The Weizmann Institute — BEEM was used to image and quantify lateral homogeneity and energy band alignments at molecule/electrode interfaces in Au/dC-X/GaAs structures, where dC-X are dicarboxylic ligands with X= H, OCH_3, CF_3, CN, or CH_3 [1]. Transport through such junctions was proposed to be dominated by "pinholes" in the dC-X film, with the Au/GaAs Schottky barrier height (SBH) at pinholes modified by the surrounding molecular film dipole [1]. BEEM images of dC-CH_3 with $V_{tip} <$ ∼1.38 eV indeed revealed isolated 20-40 nm sized "pinholes" with measured local SBHs ranging from 0.90 – 1.0 eV, consistent with the model [1]. However, between the pinholes we also observed a new conduction channel for $V_{tip} >$ ∼1.38 eV, possibly due to transport through the LUMO of the dC-CH_3 film itself. BEEM measurements for the other –X groups also showed non-uniform, film-dependent SBH, but for those films the pinholes were too dense or the films too transparent to resolve isolated pinholes. All dC-X films were stable under the BEEM hot-electron flux.

[1] H. Haick *et al.*, Adv. Mater. **16**, 2145 (2004).

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Date submitted: 02 Dec 2005 Electronic form version 1.4