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Engineering controlled Au/GaAs junctions with partial molecular monolayers C. MARGINEAN, J.P. PELZ, The Ohio State University, H. HAICK, D. CAHEN, Weizmann Institute — Advances in molecular electronics offer the possibility to use molecular-based components to enhance integrated circuits and other electronic devices. Therefore, the studies of the electronic transport properties of junctions containing molecular layers are of great interest. The local hot-electron transmittance at buried metal-dicarboxylic acid-semiconductor [1] interfaces was directly investigated with nanometer spatial resolution and meV- level energy resolution using BEEM by spatially mapping hot-electrons that were injected into the top metal thin film and passed through the diode [2]. That study found that the dominant electronic transport mechanism for some dicarboxylic ligands was though pinholes rather than direct tunneling through the molecular film, and that the effective Schottky barrier height (SBH) at the pinholes was increased by a negative electric dipole moment in the surrounding molecular film [2]. We present the results of finite element electrostatic calculations of Au/discontinuous-molecular film/GaAs structures with both positive and negative dipole films, and show that the expected decrease (or increase) of the effective SBH is consistent with BEEM measurements of these types of samples. Work supported by NSF Grant No. DMR-0805237. [1] H. Haick et al., Adv. Mater. 16, 2145 (2004). [2] H. Haick, et. al., Phys. Stat. Sol. (A) 2031, 3438 (2006).

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