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Ambipolar Ballistic Electron Emission Microscopy (BEEM) Studies of Gate-field Modified Schottky Barriers (SBs) Y. CHE, J.P. PELZ, Ohio State University — Gate-field modified SBs are important for "SB FETs" [1], and could be used to control spin and charge injection into other semiconductor device structures. We report *ambipolar* BEEM measurements on Au/Si and Cu/Si SBs (on 35nm-Si/150nm-SiO_2/p-Si silicon-on-insulator substrates) that can be changed from effective n-type to p-type by applying a positive or negative back-gate bias, respectively. This allows the conduction and valence band energies to be directly measured at the same location, to allow effects of local electric fields and local composition and defects to be directly measured. After correcting for image force lowering, the average intrinsic barrier heights (over a 200 x 200 nm^2 region) at 80K on a uniform Si film for electrons and holes respectively was 0.840 eV and 0.358 eV for Au/Si, and 0.617 eV and 0.597 eV (with statistical uncertainty $\sim$2 – 5 meV) for Cu/Si, which sum close to the $\sim$1.17eV Si bandgap at 80K. We will discuss on-going measurements of spatial variations of SB height and BEEM current amplitude on locally thinned Si film regions and in "mixed" Au/Cu bilayers, as well as efforts to improve n- and p-type ohmic contacts and to understand the dependence of lateral transport on temperature and back-bias. Work supported by National Science Foundation Grants No. DMR-0505165 and DMR-0805237.

[1] S. Heinze, et al., Phys. Rev. Lett. 89, 106801 (2002).

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