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Ambipolar Ballistic Electron Emission Microscopy (BEEM) Studies of Gate-field Modified Schottky Barriers(SBs). Y.L. CHE, J.P. PELZ, The Ohio State University — Gate-field modified SBs are important for "Schottky Barrier FETs" [1], and could be used to control spin and charge injection into other semiconductor device structures. We have made the first *ambipolar* BEEM measurements on Au/Si SBs that can be changed from effective n-type to p-type by applying a positive or negative back-gate bias, respectively. Samples were fabricated using SIMOX silicon-on-insulator wafers (35nm Si/150nm SiO_2/p-Si substrate), with Ti/Au and Pt pads as ohmic contacts for n-type and p-type operation, respectively. The local SB heights at 80K for electrons and holes were measured *at the same location* to be ~0.785eV and ~0.323eV respectively, which correspond to intrinsic SBHs of ~0.84eV and ~0.36eV after accounting for image force lowering. These sum to 1.20eV, close to the ~1.17eV Si bandgap at 80K. We will discuss ongoing measurements of the dependence of the local SBH on temperature, back-gate bias, Si film thickness, and bias between the Schottky and ohmic contacts. Future work will investigate local variations of the conduction and valence bands due to local "geometry-induced" electric fields in nanostructured contacts. 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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