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Nanometer-resolution measurement and modeling of lateral variations of the effective work function at metal-bilayer /oxide interfaces W. CAI, K. -B. PARK, J. P. PELZ, Dept. of Physics, The Ohio State University — Future CMOS technology will require metal gates with a "tunable" effective work function (EWF) to precisely adjust the transistor turn-on voltage. It was shown using *macroscopic* $C-V$ measurements that this could be done by adjusting the thickness of a very thin low-EWF metal covered by a high-EWF metal film (or vice-versa) on a SiO_2 film [1,2]. We are using nm-resolution Ballistic Electron Emission Microscopy (BEEM) and Internal Photemission (Int-PE) to investigate whether a 5-nm Pt/1.4-nm Al/SiO_2 gate stack has a *laterally inhomogeneous* energy barrier at the metal/SiO_2 interface, produced by nm-sized pinholes in the thin Al film. Initial measurements of the average BEEM threshold voltage vs. applied oxide bias do in fact suggest an inhomogeneous energy barrier at the interface. Further BEEM and Int-PE measurements and finite-element electrostatic simulations are on-going, and will be discussed. Work supported by the Semiconductor Research Corp. [1] Gao *et al.*, Mat. Res. Soc. Symp. Proc. 765, D1.4.1-6 (2003). [2] I.S. Jeon *et al.*, IEDM-04, 303 (2004).

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