

Abstract Submitted
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Band offset measurements on Metal/Hf_{1-x}Si_xO₂/Si stacks ERIC BERSCH, Rutgers University, SYLVIE RANGAN, Rutgers University, ROBERT A. BARTYNSKI, Rutgers University, ERIC GARFUNKEL, Rutgers University — The study of high-k gate dielectric stacks with metal gate electrodes is motivated by the need to reduce the size of MOSFET devices. Controlling the band offsets between the metal/high-k/Si layers of devices is critical to reducing the leakage current through the dielectric. In order to understand the band alignment at the interfaces we have measured, for each layer of the stack, the conduction band edge (CBE) using inverse photoemission, and the core levels binding energies and valence band edge (VBE) using photoemission. For the high dielectric constant alloys Hf_{1-x}Si_xO₂ (x=0, ~0.5, 1), the gap increases with x, and we will discuss the effect of x on the CBO and VBO between the silicon and the dielectric. Upon metallization with Ru or Al, Ru does not affect the position of the CBE and VBE of the dielectric, while Al induces a strong shift (~0.5 eV toward higher binding energy) of the band edges. These results will be compared to other techniques, particularly internal photoemission.

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