

Abstract Submitted
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Band offsets of atomic layer deposited Al_2O_3 , BeO and HfO_2 on Si measured by linear and nonlinear internal photoemission MING LEI, Dept. of Physics, UT Austin, JUNG YUM, SANJAY BANERJEE, Dept. of Electrical & Computer Engineering, UT Austin, MICHAEL DOWNER, Dept. of Physics, UT Austin — Hf-based high- k dielectrics recently replaced SiO_2 as gate oxide in some commercial transistors in order to continue down scaling complementary metal-oxide-semiconductor devices while minimizing leakage currents. Research continues on alternative high- k gate oxides. The required permittivity of advanced gate dielectrics must be balanced against the barrier height for tunneling and thermionic emission leakage currents governed by the offsets of their conduction and valence bands from those of the substrate. Here we present measurements of conduction band offsets of three high- k dielectrics on Si(001) substrates using linear internal photoemission (IPE), detected by measuring photocurrent from a biased MOS capacitor, and internal multi-photon photoemission (IMPE), detected by optical second-harmonic generation (SHG). We present new IPE and IMPE measurements for atomic layer deposited beryllium oxide on Si(001). Band offset measurements for Si/ HfO_2 , show a strong effect of post-deposition annealing on the energy barrier height.

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