Energy Distribution of Interface Traps in High-K Gated MOSFETs

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Abstract

We use variable rise/fall-time charge pumping (CP) to determine the energy distribution of interface trap density (Dit) and capture cross-section of electrons/holes in high-k HfO_2 gated nMOSFETs. Our results have revealed that the Dit is much higher in the upper half of the bandgap than that in the lower half of the bandgap. These results are consistent with the observation that n-channel mobilities are more severely degraded than p-channel mobilities when compared to conventional MOSFET's with SiO_2 as the gate dielectric. The results were verified by capacitance-voltage (C-V) and ac conductance techniques.

Keywords: charge pumping, energy distribution, interface trap density, capture cross-section, high k gated MOSFETs, C-V, ac-conductance.