Fermi Level Pinning at the PolySi/Metal Oxide Interface

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We report here for the first time that Fermi pinning at the polySi/metal oxide interface causes high threshold voltages in MOSFET devices. Results indicate that pinning occurs due to the interfacial Si-Hf and Si-O-Al bonds for HfO_2 and Al_2O_3, respectively. This fundamental characteristic also affects the observed polySi depletion. Device data and atomistic simulation results will be presented.