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**Hard x-ray photoemission studied and band alignment in $TiO_2/HfO_2$/Ge heterojunctions** ABDUL RUMAIZ, NSLS, Brookhaven National Laboratory, JOSEPH WOICIK, NIST, QI XIE, University of Ghent, PETER SIDDONS, NSLS, Brookhaven National Laboratory, CONAN WEILAND, NIST, CHRISTOPHE DETAVERNIER, University of Ghent — Novel high K oxides such as hafnium oxide and zirconium oxide have replaced silicon dioxide as gate oxide. Although titanium oxide has a high dielectric constant, the poor conduction band offset between titanium oxide and Si/Ge makes it a poor choice for gate oxide. One way to address this issue is to have a thin intermediate layer with appropriate band alignment between titanium oxide and the semiconductor. Here we present hard x-ray photoelectron spectroscopy (HAXPES) study on the band alignment between atomic layer deposited (ALD) $TiO_2/HfO_2$/Ge heterojunctions. The exact position of the valence band maximum was determined by convoluting theoretical calculated density of states from first-principles calculations and comparing with experimental valence band data. We will also discuss the dependence of the band alignment on the thickness of the intermediate layer.

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