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Epitaxial growth of $BaTiO_3$ on Ge PATRICK PONATH, AGHAM POSADAS, KURT FREDRICKSON, University of Texas at Austin, ALEXANDER KVIT, University of Wisconsin at Madison, ALEX DEMKOV, University of Texas at Austin — Germanium with its higher hole and electron mobility than silicon, in conjunction with a ferroelectric material like barium titanate (BTO) might be a potential candidate for a Ferroelectric RAM in the future. We report the epitaxial growth of BTO directly on a germanium (100) substrate. First, 0.5 monolayer of strontium metal is deposited on the cleaned Ge surface as a passivation layer at 600C. Molecular oxygen to a pressure of $5x10^{-6}$ torr is then introduced and barium and titanium are alternately deposited on the substrate at the same temperature. The BTO film is crystalline as-deposited and remains so throughout the growth as monitored by in situ reflection high energy electron diffraction. X-ray diffraction measurements of BTO films show only substrate peaks and (h00) peaks of BTO, indicating an in-plane ferroelectric polarization. This is expected due to the thermal expansion mismatch of BTO and Ge. We will report on efforts to induce out of plane polarization of BTO films grown on Ge. We have also measured the valence band offset between BTO and Ge using x-ray photoelectron spectroscopy (XPS) and found it to be 2.6 eV, resulting in a zero conduction band offset. We compare this value to density functional calculations of the offset.

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