Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Epitaxial Thin Films of Y doped HfO_2 CLAUDY SERRAO, ASIF KHAN, RAMESH RAMAMOORTHY, SAYEEF SALAHUDDIN, UC Berkeley — Hafnium oxide (HfO_2) is one of a few metal oxides that is thermodynamically stable on silicon and silicon oxide. There has been renewed interest in HfO_2 due to the recent discovery of ferroelectricity and antiferroelectricity in doped HfO_2. Typical ferroelectrics – such as strontium bismuth tantalate (SBT) and lead zirconium titanate (PZT) – contain elements that easily react with silicon and silicon oxide at elevated temperatures; therefore, such ferroelectrics are not suited for device applications. Meanwhile, ferroelectric HfO_2 offers promise regarding integration with silicon. The stable phase of HfO_2 at room temperature is monoclinic, but HfO2 can be stabilized in the tetragonal, orthorhombic or even cubic phase by suitable doping. We stabilized Y-doped HfO2 thin films using pulsed laser deposition. The strain state can be controlled using various perovskite substrates and controlled growth conditions. We report on Y-doped HfO2 domain structures from piezo-response force microscopy (PFM) and structural parameters via X-ray reciprocal space maps (RSM). We hope this work spurs further interest in strain-tuned ferroelectricity in doped HfO2.

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Date submitted: 06 Nov 2015 Electronic form version 1.4