Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Strain relaxation in single crystal $SrTiO_3$ grown on Si (001) MIRI CHOI, AGHAM POSADAS, RYTIS DARGIS, The University of Texas at Austin, TX, DINA TRIYOSO, Freescale Semiconductor, Austin, TX, DAVID THEODORE, Freescale Semiconductor, Tempe, AZ, CHIH-KANG SHIH, ALEXANDER A. DEMKOV, The University of Texas at Austin,TX, THE UNIVERSITY OF TEXAS AT AUSTIN, TX TEAM, FREESCALE SEMICONDUCTOR, AUSTIN, TX COLLABORATION, FREESCALE SEMICONDUCTOR, TEMPE, AZ COLLABORATION — A layer of $SrTiO_3$ grown directly on Si may be used as a pseudo-substrate in perovskite deposition. As grown, $SrTiO_3$ is compressively strained, however, by subsequent annealing in oxygen at elevated temperature, a strain relieving SiO_x buffer layer can be grown between the substrate and the perovskite layer. We perform a systematic study of strain relaxation in $SrTiO_3$ films grown on Si by molecular beam epitaxy as a function of the process conditions (annealing time, temperature, and oxygen partial pressure). Using a combination of X-ray diffraction, reflection high energy electron diffraction, and transmission electron microscopy we explore the oxidation and strain relaxation of $SrTiO_3$. We compare the kinetics of the buried oxide growth to that predicted by the conventional Deal-Grove model. An understanding of strain relaxation of $SrTiO_3$ on silicon can potentially be used to control the $SrTiO_3$ lattice constant for lattice matching with functional oxide overlayers.

Miri Choi

Date submitted: 19 Nov 2010 Electronic form version 1.4