Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

**Single crystal ternary oxide ferroelectric integration with Silicon** SAIDUR BAKAUL, CLAUDY SERRAO, LONG YOUUN, ASIF KHAN, SAYEEF SALAHUDDIN, University of California, Berkeley — Integrating single crystal, ternary oxide ferroelectric thin film with Silicon or other arbitrary substrates has been a holy grail for the researchers since the inception of microelectronics industry. The key motivation is that adding ferroelectric materials to existing electronic devices could bring into new functionality, physics and performance improvement such as non-volatility of information, negative capacitance effect and lowering sub-threshold swing of field effect transistor (FET) below 60 mV/decade in FET [Salahuddin, S, Datta, S. Nano Lett. 8, 405(2008)]. However, fabrication of single crystal ferroelectric thin film demands stringent conditions such as lattice matched single crystal substrate and high processing temperature which are incompatible with Silicon. Here we report on successful integration of $PbZr_{0.2}Ti_{0.8}O_3$ in single crystal form with by using a layer transfer method. The lattice structure, surface morphology, piezoelectric coefficient d33, dielectric constant, ferroelectric domain switching and spontaneous and remnant polarization of the transferred PZT are as good as these characteristics of the best PZT films grown by pulsed laser deposition on lattice matched oxide substrates. We also demonstrate Si based, FE gate controlled FET devices.

Saidur Bakaul
University of California, Berkeley

Date submitted: 18 Nov 2014 Electronic form version 1.4