Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Enhanced electrical mobility in the (La,Ba)SnO_3 film grown on $BaSnO_3$ (001) substrate KEE HOON KIM, Dept of physics and astronomy, CeNSCMR, Seoul Natl Univ, HYUNG JOON KIM, WOONG-JHAE LEE, TAI HOON KIM, EGON SOHN, JU-YOUNG PARK, KI-YOUNG CHOI, Seoul Natl Univ — Doped $BaSnO_3$ (BSO) systems with a perovskite structure are drawing increasing interests because of their high electrical mobility ($\approx$300 $cm^2V^{-1}s^{-1}$), wide optical band gap ($\geq$ 3.1 eV) and superior oxygen stability. In order to realize a semiconducting device with high speed based on the doped BSO films, an insulating substrate made of the BSO single crystal will be indispensable to the realization of trunly epitaxial films without structural defects. Here, we report the successful growth of an insulating BSO single crystal by using the cupric-oxide-based flux growth method with an oxidizer. After preparing the BSO(001) substrate with one side polished, we deposited epitaxial La doped BSO films on the BSO substrate (BLSO/BSO(001)) by using the pulsed laser deposition. The electrical mobility (μ) of BLSO/BSO(001) films are found to be $\approx$70-100 $cm^2V^{-1}s^{-1}$ in the low (10^{19} cm^{-3}) to high ($\geq 10^{20}$ cm^{-3}) doping ranges, which are clearly larger than those grown on $SrTiO_3$ (STO) substrate ($\approx$15-60 $cm^2V^{-1}s^{-1}$). We'll also show some of our recent efforts to realize the field effect transistor based on the BSO single crystal substrate. The present results show that the single crystal BSO substrate can offer various opportunities to realize practical electronic devices based on the doped BSO films.

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Date submitted: 14 Nov 2014 Electronic form version 1.4