

## Sym. F : Ferroelectric Thin Films

### FERROELECTRIC FIELD EFFECT

#### A-WED-05

TOP ELECTRODE ANNEALING EFFECTS IN SrBi<sub>2</sub>Ta<sub>2</sub>O<sub>9</sub>/CeO<sub>2</sub>/Si STRUCTURE, DONG SUK SHIN, HO NYUNG LEE, YONG TAE KIM (Semiconductor Materials Lab., Korea Institute of Science and Technology, Seoul, 136-791, Korea), and IN-HOON CHOI\* (Dev. of Materials Science, Korea Univ., Seoul, 136-701, Korea)

We have observed morphological changes at the interface of Pt/SrBi<sub>2</sub>Ta<sub>2</sub>O<sub>9</sub> (SBT) before and after annealing at 600 and 800°C and correlated these morphological changes with leakage currents, breakdown voltages, and capacitances of Pt/SBT/Pt/SiO<sub>2</sub>/Si and Pt/SBT/CeO<sub>2</sub>/Si gate structure. As a result, the leakage current density and capacitance are reduced from 10<sup>-7</sup> to 10<sup>-8</sup> A/cm<sup>2</sup> and 1.25 × 10<sup>10</sup> to 8.5 × 10<sup>11</sup> C/cm<sup>2</sup>, respectively, and breakdown voltage increases from 5 to 14 V after postannealing. Memory window of the ferroelectric gate is not influenced by morphological changes. The reduced leakage current density and higher breakdown voltage in the annealed samples are due to the smooth morphology of Pt which contacts to the SBT film.

#### A-WED-06

ANALYSIS OF SrTiO<sub>3</sub> STEP - FLOW GROWTH BY RHEED, N. Nakagawa, M. Lippaa, and M. Kawasaki (Department of innovative and Engineered Materials), S. Ohashi, H. Koinuma (Materials and Structures Laboratory, Tokyo Institute of Technology, Nagatsuta, Midori, Yokohama 226, Japan)

High crystallinity of thin films is required for various device applications. For SrTiO<sub>3</sub> thin films, the step flow growth mode is expected to give higher crystallinity and better electrical properties than other growth modes such as layer-by-layer growth. SrTiO<sub>3</sub> homoepitaxial films were deposited by pulsed laser deposition in a chamber equipped with reflection high energy diffraction (RHEED) specular spot intensity monitoring system. A Nd:YAG laser system were not used for substrate heating, making it possible to achieve high temperature even in an oxygen atmosphere. SrTiO<sub>3</sub> film were grown at various temperature and excimer laser pulse rates, RHEED specular intensity was modulated synchronously with the excimer laser pulses. This modulation corresponds to nucleation, surface migration on the terraces and the restoration of the original step and terrace structure. The surface of even thick films maintained the step and terrace structure as observed by AFM.

#### A-WED-07

NITROGEN ANNEALING EFFECTS ON THE ELECTRICAL PROPERTIES OF LEAD ZIRCONATE TITANATE (PZT) THIN FILMS, CHANG JUNG KIM, T. Y. KIM, J. K. LEE and ILSUB CHUNG (Electronic Materials Lab., Materials Sector. Samsung Advanced Institute of Technology, P.O. Box 111. Suwon, Korea 440-600)

The lead zirconate titanate (PZT) thin films were fabricated using sol-gel spin coating onto Pt/Ti/SiO<sub>2</sub>/Si substrates. Effect of the annealing atmosphere for crystallization on the microstructure and electrical properties of the PZT thin films were studied. The films were fabricated with different annealing atmosphere (N<sub>2</sub>, O<sub>2</sub>, air) at 650 °C for 30 min using diffusion furnace. The crystallization and microstructure of the films were observed using x-ray diffraction and scanning electron microscopy (SEM), respectively. The P-E hysteresis curve and the fatigue characteristics were investigated using a RT66A. The current-density of the films were investigated using Keithly 236. The film annealed in nitrogen gas showed higher hysteresis parameters than those in gas consisting of oxygen.