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EFFECT OF EXCESS-Bi ON ELECTRICAL PROPERTIES IN Sr-DEFICIENT SBT THIN FILMS, CHAE IL CHEON and JEONG SEOG KIM (Dept. of Materials & Chemical Eng., Hoseo University, San 29-1, Sechul, Baebang, Asan, Chungnam 336-795, Korea)

$SrBi_2Ti_2O_9$(SBT) thin films have a high potential for a non-volatile ferroelectric random access memory due to excellent ferroelectric properties such as no fatigue, low switching voltage, and etc. Several researchers have studied on the phase formation and ferroelectric properties in nonstoichiometric SBT thin films involving Sr-deficient and/or Bi excess composition. According to their reports, Sr-deficient SBT thin films show better ferroelectric properties than stoichiometric SBT thin films. The effect of excess Bi, however, is unclear up to now. In this study nonstoichiometric SBT thin films involving Sr-deficient and Bi-excess $Sr_{0.7}Bi_{2+x}Ta_2O_9$ were prepared by MOD method. Phase formation, microstructures, and electrical properties (P-E hysteresis, C-V, I-V and so on) were investigated. The effect of excess-Bi on electrical properties will be discussed in relation to the crystal structure and microstructure.

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CHARACTERISTICS OF ZnO/DIAMOND THIN FILMS PREPARED BY RF MAGNETRON SPUTTERING, Y.W. Park, S.J. Yoon, J-K. Lee, Y-J. Baik, S.K. Koh, H.J. Kim, H-J. Jung, W.K. Choi(Thin Film Technology Center, Korea Institute of Science and Technology, Seoul, Korea), B.H. Cho(Department of Electrical engineering, Suwon University, Korea), C.Y. Park(Department of Electrical engineering, Yonsei University, Seoul, Korea)

Due to its high Young's modulus, diamond has the highest acoustic wave velocity among all materials, which is expected to be a candidate substrate for high frequency surface acoustic wave (SAW) devices. In this study, the deposition of ZnO, as a piezoelectric layer, on diamond substrate is investigated. ZnO has been fabricated by RF magnetron sputtering using ZnO target with the variation of Ar/O_2 gas ratios, RF power, distance, and substrate temperature at 10^{-5}Torr vacuum. Sputtered ZnO films are characterized by x-ray photoelectron spectroscopy (XPS), Rutherford backscattering spectroscopy (RBS), x-ray diffraction (XRD), and Van der pauw method. All the films show only (002) orientation, and XPS study points out the absence of contamination except hydroxyl tail on the films surface due to air exposure. The electrical resistivity of the films is in the range of 10^1 to $10^8\Omega$cm depending on gas mixture ratio of Ar/O_2. SAW characteristics of ZnO/Al(IDT)/d-iamond structure are discussed.

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OPTICAL PROPERTIES OF THE PLT FILMS WITH VARIOUS COMPOSITION ON THE QUARTZ AND SURFACE MODIFICATIONS, YOUNG SOO YOON, W.K.Choi, S.K. KOH and HYUNG JIN JUNG (Thin Film Technology Research Center, KIST, Seoul 130-650, Korea)

$(Pb_{1-x}La_x)TiO_3$ (PLT) films with various composition of the La were deposited by sol-gel process on the quartz substrates in order to study optical properties. X-ray patterns indicated that the <100> direction of the PLT film was dominant with increase of the La concentration due to decrease of lattice constant of c-axis. A spectrometer with the 200nm-800nm range of wavelength was adopted to measure the transparent properties of the PLT film on the quartz. All PLT films showed an absorption threshold wavelength of around 350 nm regardless of the La concentration. From spectrometer results and the assumption of direct band-to band transition, refractive index, absorption coefficient and optical band gap were calculated. In addition, we modified the PLT surface using oxygen ion beam with low energy. The optical characteristics of the PLT films were changed by this ion beam modification. Atomic force microscopy measurements indicated that the surface morphologies of the PLT film were changed. In order to investigate the oxygen state of the PLT film, XPS analysis was conducted before and after surface modification

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DEPENDENCE OF ELECTRON CONCENTRATION ON OXYGEN PARTIAL PRESSURE IN ZnO, EUN-DONG KIM, HO-YONG KIM, and MUN-SOO YUN (Division of Electrical Materials, Korea Electrotechnology Research Institute, P. O. Box 20, Changwon, 641-600 Gyungnam, Korea)

Application of the mass-action law followed by the Henry's law to the single ionization process of donor defects V_O and/or Zn_i in nonstoichiometric ZnO is likely to explain the earlier experimental results by conductivity measurements, $n \propto P_{O_2}^{-1/4}$. It is noted that a conductivity change is not always responsible for a carrier concentration change because of such effects as the Schottky barrier between Pt-electrode and ZnO crystal.

In the interstitial model, if Zni has a second ionization probability,

$$n^3 - K_Z K_{ZS} (P_{O_2}^{-1/2}) n - K_Z K_{ZD} 2 P_{O_2}^{-1/2} = 0$$

where K_Z, K_{ZS}, K_{ZD} are the mass relation equilibrium constants for the formation, single ionization and double ionization processes of Zn_i, respectively. Hence the authors propose that the defect ionization processes are ruled by the Fermi-Dirac(FD) statistics while the mass law is still effective for the defect formation reactions.

Employing the FD statistics revwals that $n \propto P_{O_2}^{-1/2}$ whenever the defects ionize singly and/or doubly. We'd like the proposed relation calculated by the FD statistics to be experimentally proven.

POSTER SESSION