TUESDAY

Sym. F : Ferroelectric Thin Films

PROCESS INTEGRATION

A-TUE-15

THE STRESS EFFECT OF AN Ir TOP ELECTRODE ON HIGH DIELECTRIC (Ba,Sr)TiO_3 CAPACITORS, SEON Y. CHA, B. T. JANG and H. C. LEE(Dept. of Electrical Engineering, KAIST, 373-1 Kusong-dong, Yusong-gu, Taejon, 305-701, Korea)

In the previous work, we reported that Ir can be a good candidate for the bottom electrode material of high dielectric BST capacitors instead of Pt.[1] In this study, it has been found that electrical properties of BST capacitors can be also improved by using Ir as a top electrode material. Electrical properties of BST capacitors are investigated by using two types of capacitor structures, Pt/BST/Ir /SiO_2/Si and Ir/BST/Ir/SiO_2/Si. BST capacitors using an Ir top electrode show lower leakage current and higher dielectric constant in comparison with those using Pt. In order to clarify the effect of an Ir top electrode on BST capacitors, lattice constants of BST films with two kinds of electrodes are measured by XRD technique. As a result, it is found that BST film using an Ir top electrode exhibits larger compressive stress than those using Pt. This result indicates that electrical properties of BST capacitors are closely related with the stress of the BST film induced by the top electrode material.

[1] S.Y. Cha, et al., Integrated Ferroelectrics, 1997, 17, p.187.

A-TUE-16

CHARACTERIZATION OF RuO_2 ELECTRODES FOR FERROELECTRIC FILMS PREPARED BY MOCVD USING $Ru(C_{11}H_{19}O_2)_3$, J. M. LEE, S. Y. KANG, J. C. SHIN, C. S. HWANG and H. J. KIM (School of Mat. Sci. Eng, Seoul Nat'l Univ., Seoul 151-742, Korea), C-G. SUK (R&D Center, APEX Co. Ltd., Chungbuk 363-810, Korea)

Highly conductive RuO_2 recently attracts considerable interest because it is one of candidate electrode materials for ferroelectric memory devices. For the deposition of electrode materials, conformal deposition techniques are essentially required, because of the 3-dimensional capacitor structure of integrated memory devices. In this study, high quality RuO_2 thin films with a good electrical conductivity were deposited by MOCVD using $Ru(C_{11}H_{19}O_2)_3$ [Ru-TMHD]. With a conventional bubbler system, deposition behavior and properties of RuO_2 thin film were affected by both the substrate temperature and the added amount of oxygen during deposition. RuO_2 films showed excellent surface roughness and resistivity which were comparable to those of sputtered RuO_2 films. RuO_2 electrodes were also deposited on ferroelectric thin films by direct liquid injection (DLI) system using solution of Ru-TMHD. The electrical properties of the ferroelectric capacitors were as good as those using sputtered electrodes.

*This work was supported by Samsung Electronics Co. Ltd.

A-TUE-17

MICROSTRUCTUAL CHARACTERIZATION OF Pt/Ti AND Pt/TiOx ELECTRODES FOR SrBi2Ta2O9 (SBT) CAPACITORS, S. J. YEOM, S. Y. KWEON, N. K. KIM, H. J. SUN, Y. S. YU, and S. K. LEE (Semiconductor Research Division, HYUNDAI electronics, Ichon, 467-701, Korea)

The most widely used electrode for SBT capacitors is Pt/Ti system because of the high annealing temperature in O_2. However, it is well known that the Pt/Ti electrode system has two major instability problems. One is hillock formation, which can lead to capacitor shorts, and another is diffusion of Ti during the thermal cycling. In this work, we investigated the effects of RTO treatment of Ti before Pt deposition on diffusion characteristics of Ti. Also, the electrical properties of SBT capacitor were investigated. Most of SBT capacitors on Pt/Ti electrode were shorted and these effects could be solved by RTO treatment of Ti before the Pt deposition. It was found that Pt/TiO_x electrode shows smooth surface while Pt/Ti shows rough surface even after bottom electrode annealing. Moreover, Ti diffusion can be suppressed by forming TiO_x before the Pt deposition. The absence of Ti significantly enhances the electrical properties of SBT capacitors. 2Pr values for the SBT capacitors on Pt/TiO_x and Pt/Ti electrodes are 14~16 mC/cm^2 and 10~12 mC/cm^2, respectively..

Sym. F : Ferroelectric Thin Films

CHEMICAL VAPOR DEPOSITION

A-TUE-18

PROPERTIES OF (Ba,Sr)TiO_3 THIN FILMS DEPOSITED BY MOCVD

H.B. PARK, C.S. KANG, C.Y. YOO, S.H. JOO, W.D. KIM, B.T. LEE, H. HORII, K.H. LEE, S.I. LEE

Semiconductor R&D Center, Samsung Electronics Co.
San #24, Nongseo-Ri, Kiheung-Eup, Yongin-City,
Kyungki-Do, 449-900, Korea

BST thin films were prepared on 8" Pt/SiO_2/Si substrates with MOCVD varing substrate temperature(Ts). Ba(DPM)$_2$-tetraglyme, Sr(DPM)$_2$-tetraglyme and Ti(DPM)$_2$(O-i-Pr)$_2$ were used as sources. BST films deposited at the Ts from 420~480℃ showed good step coverage(>85%) and within-wafer unformity of about 9%. Over 480℃, the uniformity was improved, while step coverage was below 50%.

With 350Å-thick-BST thin films deposited at 420℃, the electrical properties of Pt/BST/Pt capacitor post-annealed at temperatures from 650℃ to 800℃ were investigated. Dielectric constant increased 120 to 160 and Tox.eq decreased 10 to 7.5Å with annealed temperature. Leakage current density and dielectric loss(tan δ) was below 100nA/cm^2 and 1%, respectively.