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THERMAL STABILITY OF RuO₂ AND Ru THIN FILMS IN THE VARIOUS AMBIENTS, JOON-HYUNG AHN, J.-H. PARK, G.-P. CHOI, W.-Y. CHOI, H.-G. KIM (Dept. of Mat. Sci. and Engr., KAIST, Taejon, 305-701, Korea), W.-J. LEE (Semi. Tech. Div., ETRI, Taejon, 305-350, Korea) and S.-G. YOON (Dept. of Mat. Engr., Chungnam National Univ., Taejon, 305-764, Korea) In recent years, RuO₂ and Ru thin films have been widely investigated for their application in integrated ferroelectric capacitors, due to their excellent etching properties, oxygen diffusion barrier characteristics and so on. In this study, we fabricated stoichiometric RuO₂ and Ru thin films by conventional dc magnetron sputtering and then systematically investigated their thermal stability in the various ambient to check the applicability for integrated ferroelectric capacitors. Annealing was done in oxygen, argon and vacuum ambient between 400°C and 800°C for 30 min.

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DEGRADATION MECHANISM OF Pt/Ti THIN FILMS DUE TO ANNEALING IN AN OXYGEN AMBIENT, U. B. KANG, Y. -H. KIM (Dept. of Mat. Eng., Hanyang Univ., Seoul, 133-791, Korea)

Pt/Ti thin films are widely used as a bottom electrode for a ferroelectric materials. The annealing at high temperature in an oxygen ambient to get optimum dielectric properties degrades the adhesion between Pt/Ti thin film and substrate. We investigate the degradation mechanism of Pt/Ti thin films after annealing in an oxygen ambient. Ti and Pt films were successively deposited onto SiO₂/Si and SiN_x/Si substrates by using DC magnetron sputtering system. The specimens were annealed in an oxygen and a vacuum ambient. The adhesion of Pt/Ti thin films were evaluated by adhesive tape test, scratch test, and peel test. The TiO₂ phase which formed after annealing in oxygen results in the volume expansion. Adhesion degradation after oxygen annealing is attributed to the formation of the brittle TiO₂ phase, the depletion of Ti adhesion layer, and the increase of internal stress.

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ELECTRICAL PROPERTIES OF PZT THIN FILMS DEPOSITED ON Ir, IrO₂ BOTTOM ELECTRODES BY REACTIVE SPUTTERING, H. S. LEE, H. G. SHIN, K. H. AUH (Dept. of Ceramic Eng., Ceramic Processing Research Center, Hanyang Univ., Seoul 133-791, Korea), I. D. KIM, W. Y. CHOI, Y. J. PARK (Dept. of Mat. Sci. and Eng., KAIST, Taejon, 305-701, Korea), K. T. HWANG, W. S. UM (KITECH-KTL, Seoul 152-053, Korea)

Polycrystalline PZT thin films were prepared on Pt, Ir and IrO₂ electrodes, Electrode materials such as Ir and IrO₂ were annealed to increase crystallinity of films. Ir were annealed in Ar while IrO₂ were annealed in O₂. Crystallinity and morphology were examined by XRD, SEM, and AFM. Microstructure and interface were observed using TEM and AES. High quality of PZT thin film was obtained by using IrO₂. There was no appreciable roughening of the interface between the PZT and the IrO₂, though Ir electrode has rough surface. IrO₂ phase was formed by the oxidation of Ir electrode by reaction with oxygen during deposition process. Electrical properties of PZT thin films using IrO₂ electrodes were better than that of Pt and Ir electrodes, especially PZT thin film using IrO₂ electrode showed no fatigue up to 10¹¹ cycles.

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CHARACTERISTICS OF SOL-GEL PZT FERROELECTRIC CAPACITOR FOR Ir ELECTRODES. SUNGWON JUNG, ILHWAN BANG, JIYOUNG KIM, (Dept. of Materials Eng., Kookmin Univ.. Seoul 136-702, Korea.)

Pt electrode is the most conventional electrode material for ferroelectric capacitors. However, the capacitor with Pt electrode exhibits a problem for fatigue behaviors. Conductive oxides, such as IrO₂, are suggested as new electrode materials for ferroelectric capacitors, because they might avoid the fatigue issues due to their high oxygen contents. Since Ir could be easily oxidized while keeping high electrical conductivity, Ir electrode might lead to fatigue-free ferroelectric characteristics.

In this study, sol-gel PZT capacitor was prepared in order to investigate the effect of Ir electrode. The 2000Å thick bottom electrode of ferroelectric capacitor was deposited by sputtering. 3500Å PZT film were deposited by sol-gel method. PZT perovskite phase shown (001) and (111) peak of perovskite structure was observed by XRD. Characteristics of ferroelectric capacitor were measured for hysteresis and fatigue behaviors by RT66A. The remnant polarization (Pr) and the coercive field (Ec) were 30μC/cm² and 70kV/cm on applied voltage of 5V. The sample showed no significant fatigue manes up to 10⁹ cycles under ±10V large square signal for 1MHz