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THE EFFECTS OF OXYGEN VACANCIES ON THE ELECTRICAL PROPERTIES OF $(Ba,Sr)TiO_3$ CAPACITORS, IL J. KIM, B. T. JANG, S. Y. CHA and H. C. LEE (Dept. of Electrical Eng., KAIST, Taejon, 305-701, Korea)

We investigate the electrical properties of rf-magnetron sputtered $Ba_{0.5}Sr_{0.5}TiO_3$ capacitors by varying the RTA(Rapid Thermal Annealing) temperature and atmosphere. The dependence of the electrical properties of Pt/BST/Pt capacitors on the RTA condition indicates that oxygen vacancies within BST thin films seems to affect the electrical properties of Pt/BST/Pt capacitors. In order to clarify the relation between the oxygen vacancies and the electrical properties of Pt/BST/Pt capacitors, we have examined by using the two different post-annealing methods. The one annealing was performed in O_2 gas at 450℃, 20mtorr. The other was done in O_2-plasma under the same conditions. It was found that the leakage current density of O_2-plasma annealed BST capacitors was much lower than that of O_2 annealed capacitors. The dielectric constant of O_2 annealed capacitors decreased about 14% comparing with that of as-deposited. In contrast, there was no decrease of the dielectric constant of O_2-plasma annealed capacitors. It is considered that O_2-plasma which contains many reactive oxygen atoms is very effective in repairing oxygen vacancies within BST thin films. This repairing is due to the reaction between oxygen vacancies with reactive oxygen atoms. As a result, it was concluded that oxygen vacancies within BST thin films greatly affect the leakage current and dielectric constant of Pt/BST/Pt capacitors. These results also indicate that oxygen vacancies within BST films should be repaired sufficiently to reduce the leakage current significantly without the decrease of dielectric constant.

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ELECTRICAL PROPERTIES OF $(Ba,Sr)TiO_2$ WITH IRIDIUM ELECTRODES, JEONG-HO PARK, Joon-Hyung AHN AND Ho-Gi KIM (Dept. of Mat. Sci. and Engr., KAIST, Taejon, 305-701, Korea)

Barium strontium titanate thin film has attracted great interest as one of dielectric materials for high density DRAMs because of its high dielectric constant. On the other hand, electrode materials play a important role in electrical properties of capacitor such as capacitance and leakage current. In this study, Ir thin films were prepared by DC magnetron sputtering as electrode and BST thin films were deposited on Ir & Pt thin films by RF magnetron sputtering. we investigated the effects of electrode materials on electrical properties of BST thin films. The relationship between electrical properties(capacitance & leakage current, etc.) and microstructures of BST thin films were also studied.

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SYNTHESIS AND CHARACTERIZATION OF NEW HIGH DIELECTRIC $(BA_{0.65}SR_{0.35})(TI_{0.65}ZR_{0.35})O_3$ FILMS, JIN-CHEOL KIM, W.M.PARK, S. NAHM, AND J. D. BYUN (Dept. of Mat. Sci. and Eng., Korea Univ., Seoul 136-701, Korea) M. H. KIM(Dept. of Mat. Sci. and Eng., Changwon National Univ., Changwon, 641-773, Korea)

$(Ba_{0.65}Sr_{x0.35})(Ti_{0.65}Zr_{0.35})O_3$ (BSTZ) films, about 200 nm thick, were deposited on $Pt/Ti/SiO_2/Si$ using metal-organic decomposition (MOD) spin coating method and subsequently annealed at various temperatures. The film has a cubic perovskite structure with [100] preferred orientation. The dielectric constant and leakage current of the film increased with annealing temperature. For the BSTZ film annealed at 750℃, the dielectric constant, dielectric loss and leakage current density were 977 , 0.04 and 3.47×10^{-7} A/cm^2 at 1.25 V, respectively.

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A STUDY ON THE CRYSTALLIZATION BEHAVIOR AND ELECTRICAL PROPERTIES OF TWO-STEP PROCESSED BST THIN FILMS, Deok-Sin Kil, Byung-Il Lee and Seung-Ki Joo, Div. of MS. & E., College of Engineering, Seoul National University, San 56-1, Shillim-dong, Kwanak-ku, Seoul, 151-742, Korea)

High temperature processed BST thin films tend to show much higher leakage current due to their columnar structure in spite of high dielectric constant. In this work, two-step processed BST thin films with very thin(<10nm) seed layer were prepared at 350℃ by rf sputtering method. BST film having seed layer(<10nm) deposited at 700℃ could be completely crystallized without any extra post annealing and showed (111) preferred orientation unlike the (110) for one step processed films. Especially, the electrical properties of BST films was significantly changed with the thickness variation of seed layer. 20nm thick BST film having 10nm thick seed layer showed the SiO_2 equivalent thickness of 0.26nm and leakage current could be maintained at 10^{-8}A/cm^2 up to 2.3V.

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