Sym. F : Ferroelectric Thin Films

PROCESS INTEGRATION

A-TUE-11

THICKNESS DEPENDENCE OF CAPPING BARRIER TIO2 ON THE HYDROGEN RELATED DEGRADATION OF PT/PZT/PT FERROELECTRIC CAPACITOR IN DOUBLE LEVEL METALLIZATION FRAM, S. Y. LEE, B. J. KOO, D. J. JUNG, B. H. KIM, S. O. PARK, AND K. N. KIM (Technology Development 3 Team, Semiconductor R & D Center, Samsung Electronics, Co. San#24, Nongseo-Li, Kiheung-Eup, Yongin-City, Kyungki-Do, Korea, 449-900)

Ferroelectric memory back-end integration processes involving hydrogen are well known to degrade platinum electrode based ferroelectric capacitor. Various thicknesses of capping barrier TiO2 over Pt/PZT/Pt ferroelectric capacitor are tested in different hydrogen content ILD2/IMD in our 64K density double level metal 1T/1C FRAM to examine the effectiveness of TiO2 against hydrogen damage. In the case of ECR oxide, over 500Å capping TiO2 acts effectively as a hydrogen barrier showing saturated Pr above 500Å TiO2. Whereas in the case of PE-TEOS even 1000Å capping TiO2 can not remove hydrogen related degradation. It reveals that capping barrier TiO2 effectively acts as a barrier against hydrogen attack and barrier property strongly depends on the thickness of capping TiO2.

A-TUE-12

EFFECTS OF THE INTERLAYER DIELECTRICS ON THE ELECTRICAL PROPERTIES OF Pt/$SrBi_2Ta_2O_9$/Pt CAPACITORS FOR NON-VOLATILE MEMORY APPLICATION, SUK-KYOUNG HONG, JAE-WHAN KIM, YOUNG MIN KANG, SEOK WON LEE, CHANG KOO LEE, CHUNG WON SUH, AND J. LEE (Semiconductor Research Division, Hyundai Electronics Industries Co., Ltd., San 136-1, Ami-ri, Bubal-eup, Ichon-si, Kyoungki-do, 467-701, Korea)

$SrBi_2Ta_2O_9$ (SBT) thin film is one of promising capacitor materials for the ferroelectric devices. However, the optimization of the back-end integration process is very critical in the realization of ferroelectric memories since the SBT capacitors could be degraded during the integration process.

In the present work, Pt/SBT/Pt capacitors for memory devices were fabricated under various integration conditions and the electrical properties of the capacitors were traced through the processes. Effects of the interlayer dielectrics and the post recovery annealing on the electrical properties of the SBT capacitors were investigated.

A-TUE-13

EFFECT OF ANNEALING ATMOSPHERE ON THE DELAMINATION OF Pt LAYER IN SiO_2/Pt/PZT/Pt STRUCTURE

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Silicon dioxide was deposited on the Pt/PZT/Pt capacitors by rf-plasma chemical vapor deposition. This structure of SiO_2/Pt/PZT/Pt capacitor was annealed to remove plasma damage. The Pt layer on the top of capacitor was delaminated after annealing in the oxygen atmosphere over 300 ℃. The delamination did not occur for sputtered oxide even at annealing temperature of 500 ℃. It was also found that the annealing atmosphere was critical to development of the delamination for PECVD oxide. We investigated the delamiantion mechanism for the Pt/PZT/Pt capacitor with the PECVD oxide on the Pt top electrode with respect to the chemical bonding of Si-H and Si-OH in the PECVD oxide film.

A-TUE-14

IMPROVEMENT OF PROPERTIES IN (Ba,Sr)TiO_3 WITH PEROVSKITE ELECTRODES, SUNG-SIK PARK, BOUM-SOUK KIM, DUCK-KYUN CHOI (Dept. of Inorg. Mat. Eng, Hanyang Univ., Seoul, 133-791, South Korea)

Conductive oxide electrode RuO_2 has been explored as a promising candidate for BST dielectric material under the expectation that it could solve the problems which the typical electrode like Pt faces. However, RuO_2 has to be further investigated for reliable application. High leakage current turned out to be the most serious problem currently hampers the application of RuO_2. Such problem and the other minors are thought to be closely related to the structural, chemical mismatch between RuO_2 and BST.

In this study, we evaluated new perovskite type electrode materials, CSR[(Ca,Sr)RuO_3] and BSR[(Ba,Sr)RuO_3]. Special consideration was given to BSR electrode since it has not only a structural match but also a chemical similarity. Dielectric properties and leakage current density of BST films on CSR and BSR electrodes will be discussed.