

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.

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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 500 Å capping TiO₂ acts
effectively as a hydrogen barrier showing saturated Pr above
500 Å TiO₂. Whereas in the case of PE-TEOS even 1000 Å
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/SrBi₂Ta₂O₉/Pt
CAPACITORS FOR NON-VOLATILE MEMORY
APPLICATION, SUK-KYOUNG HONG, JAE-WHAN
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SrBi₂Ta₂O₉ (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 SiO₂/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 SiO₂/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 °C. The delamination did not occur for sputtered oxide
even at annealing temperature of 500 °C. It was also found
that the annealing atmosphere was critical to development of
the delamination for PECVD oxide. We investigated the
delamination 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)TiO₃
WITH PEROVSKITE ELECTRODES, SUNG-SIK PARK,
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Conductive oxide electrode RuO₂ 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, RuO₂ has
to be further investigated for reliable application. High
leakage current turned out to be the most serious
problem currently hampers the application of RuO₂.
Such problem and the other minors are thought to be
closely related to the structural, chemical mismatch
between RuO₂ and BST.

In this study, we evaluated new perovskite type electrode
materials, CSR[(Ca,Sr)RuO₃] and BSR[(Ba,Sr)RuO₃].
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.