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r.f. magnetron sputtering에 의해 제조된 $SrBi_2Ta_2O_9$ 박막의 특성 및 전기적 성질

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Characterization of $SrBi_2Ta_2O_9$ thin films grown by r.f. magnetron sputtering and their electrical properties

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Ferroelectric thin-film capacitors have been extensively investigated with high expectations for nonvolatile memory application. PZT is one of the most popular and promising materials, but tend to degrade most of the initial amount of switching charge (fatigue) after $10^7 \sim 10^8$ cycles of full polarization switching. $SrBi_2Ta_2O_9$(SBT) have become candidates for use in nonvolatile memory application due to fatigue free property, low coercive field, low relative dielectric constant and low leakage current density. Therefore alternate candidate material to control the fatigue problem in ferroelectric capacitor is SBT.

SBT thin films for nonvolatile memory application were deposited onto $Pt/Ti/SiO_2/Si$ substrate by r.f. magnetron sputtering using ceramic target. In other to verify the effects of substrate temperature(Ts), Ts was changed between 400℃ and 600℃. Electrical properties were found to depend on gas pressure during deposition. This effect may be interpreted in terms of variations in film stoichiometry (particulary Bi content).

The films were crystallized completely above 500℃. With increasing the bismuth amount, the (105) diffraction peak film indicating the formation of a bismuth layer structure was increased. The remanent polarization, Pr of films was greater than $4.5\,\mu C/cm^2$ and the leakage current was about $10^{-8} A/cm^2$ at driving voltage of 3V.

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