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비휘발성 기억소자를 위한 $Pt/SrBi_2Nb_2O_9/Al_2O_3/Si$ 구조의 특정에 미치는 Al_2O_3 완충층의 효과

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$Pt/SrBi_2Nb_2O_9$ (SBN)/Al_2O_3/Si (MFIS) ferroelectric gate oxide structure were prepared by rf (radio frequency) magnetron sputtering method for application of non-destructive read out ferroelectric RAM (NDRO-FRAM) devices. An Al_2O_3 intermediate layer between the perovskite $SrBi_2Nb_2O_9$ film and Si substrate prevent the serious inter-diffusion of $SrBi_2Nb_2O_9$ (SBN) into Si substrate. Coercive field that decisively affects the memory window was greatly increased by inserting the Al_2O_3 insulator between SBNand Si, and thus the memory window also increased with the increasing of electric field to the SBN. Memory windows of MFIS structure were in the range of 0.7-3.4 V when the gate voltage varied from 3 to 9 V. Memory windows of MFIS structure were found to be dependent on the thickness and stoichiometry of the buffer layer. We obtained the maximum memory window in MFIS with 11.4 nm thickness of an insulator deposited at the deposition condition of 15:5 flow ratio ($Ar:O_2$) during sputter. High resolution transmission electron microscopy (HRTEM) of SBN/Al_2O_3(11.4 nm)/Si structure showed that the Al_2O_3 thin films as a buffer layer helped to prevent the formation of interfacial layer and interdiffusion between SBN and Si and x-ray photoelectron spectroscopy (XPS)data indicated that composition of Al_2O_3 was dependent on Ar and O_2 flow ratio in the sputtering deposition conditions.