Feasibility of ferroelectric materials as a blocking layer in charge trap flash (CTF) memory

Zhang Yongjie, Ho-Myoung An*, Hee-Dong Kim, Ki-Hyun Nam*, Yu-Jeong Seo, and Tae-Geun Kim
Korea Univ. *Kwangwoon Univ.

Abstract : The electrical characteristics of Metal-Ferroelectric-Nitride-Oxide-Silicon (MFNOS) structure is studied and compared to the conventional Silicon-Oixde-Nitride-Oxide-Silicon (SONOS) capacitor. The ferroelectric blocking layer is SrBiNbO (SBN with Sr/Bi ratio 1-x/2+x) with the thickness of 200 nm and is fabricated by the RF sputter. The memory windows of MFNOS and SONOS capacitors with sweep voltage from +10 V to -10 V are 6.9 V and 5.9 V, respectively. The effect of ferroelectric blocking layer and charge trapping on the memory window was discussed. The retention of MFNOS capacitor also shows the 10-years and longer retention time than that of the SONOS capacitor. The better retention properties of the MFNOS capacitor may be attributed to the charge holding effect by the polarization of ferroelectric layer.

Key Words : Metal-Ferroelectric-Nitride-Oxide-Silicon (MFNOS), SONOS, FRAM, MFIS, Ferroelectric blocking layer, SBN