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Effect of Buffer Layer and Barrier on Bistability for Non-volatile Memory Fabricated with Al nano-crystals Embedded in α -NPB

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Organic bistable devices (OBD) are a promising non-volatile memory with the integration density of Tera-bits. We developed a new organic non-volatile memory fabricated with the device structure of Al/α -NPB/Al nano-crystals surrounded by amorphous Al_2O_3/α -NPB/Al using O_2 plasma oxidation.

I-V characteristics of the OBDs obtained by sweeping the voltage from 0 to 10V. The results demonstrated the threshold (Vth), program (Vp), and erase (Ve) voltage were about 3, 4.5, and 6.2V, respectively and the conduction current bistability is $> 1x10^2$. The voltage between Vp and Ve is a region of negative differential resistance (NDR).

In this work, we studied effect of buffer layer and barrier on bistability for non-volatile memory. By adding buffer layer, the OBD's conduction current was increased and bistability was enhanced. In particular, NDR region was more wide and larger value. In contrast, the OBDs added barrier had lower conduction current and smaller NDR.

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Keywords: non-volatile memory, bistability, organic bistable device

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Design and ferroelectric properties of randomly oriented polycrystalline Eu-substituted $Bi_4Ti_3O_{12}$ thin films

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Ferroelectric Eu-substituted $Bi_4Ti_3O_{12}$ (BET) thin films with a thickness of 200 nm were fabricated on Pt(111)/Ti/SiO_2/Si(100) substrates by means of the liquid delivery metal organic chemical vapor deposition (MOCVD). X-ray diffraction (XRD) and scanning electron microscopy (SEM) were used to identify the crystal structure, the surface and cross-section morphology of the deposited ferroelectric films. After annealing above 640 °C, the $Bi_{3.3}Eu_{0.7}Ti_3O_{12}$ thin films are crystallized and exhibit a polycrystalline structure. $Bi_{3.3}Eu_{0.7}Ti_3O_{12}$ thin films show a large remanent polarization ($2P_r$) of 37.71 $\mu C/cm^2$ under a maximum applied field of 5 V and high dielectric constant (ε_r) of 410 at the frequency of 10 kHz. The BET thin films exhibited a 7 % reduction of switching charge for at least up to 10^{11} switching cycles at a frequency of 1 MHz.

Keywords: Ferroelectric, Eu-substituted, polycrystalline