The effect of SAM interlayer on the crystalline orientation of PVDF-TrFE thin film in ferroelectric polymer capacitor

YOUN JUNG PARK, SEOK JU KANG, CHEOLMIN PARK, Department of Materials Science and Engineering, YONSEI UNIVERSITY, SEOUL, KOREA TEAM — Poly vinylidene fluoride-co-trifluoroethylene (P(VDF-TrFE)), one of the representative ferroelectric polymers, was used for a fabrication of metal-ferroelectrics-metal capacitor. As one way to control the crystalline structure of P(VDF-TrFE) in thin films, we formed organic buffer layer of self assembled monolayers (SAMs) between polymer films and bottom metal electrodes. The preferred orientation of P(VDF-TrFE) crystal with its $b$-axis perpendicular to the substrate without the insertion of an interlayer was changed into the orientation with $a$-axis of the crystal normal to the surface after the treatment of CH$_3$-terminated alkanethiolate SAMs on bottom electrodes. Other kinds of alkanethiolates with their terminal groups of –OH and –COOH did not induce such an orientation shift in crystalline polymer thin films. The evolution of ferroelectric crystalline microdomains of P(VDF-TrFE) in the presence of various alkanethiolate SAMs interlayer was characterized by atomic force microscope (AFM), transmission electron microscope (TEM), grazing x-ray diffraction (GIXD) and displacement-electric field hysteresis loop measurement.

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Date submitted: 28 Nov 2006

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