

# Poster Presentations

## [MS34-P03] Thickness dependent dipole orientation change in P(VDF-TrFE) ultrathin films

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Ultrathin films (thickness < 100 nm) of the ferroelectric copolymer P(VDF-TrFE) recently attracted a great deal of interest due to their application in new flexible devices such as nonvolatile memories and solar cells, etc. The geometric constraint in polymer films always causes preferred orientation change.[1] For P(VDF-TrFE) films, this may significantly affect their electric performance because of the anisotropic ferroelectric and piezoelectric response of the copolymer.[2] However, the details are still unclear. The experimental difficulty comes from both homogeneous sample preparation and structural characterization. [3] In this work, we investigate the structural characteristics of P(VDF-TrFE) films with a wide range of thickness on different substrates. Due to the overlapped (110) and (200) peaks in the normal XRD patterns, Grazing Incidence X-ray Diffraction (GIXD), 2D XRD and infrared reflection adsorption spectroscopy (IRRAS) are combined to analyze the thinning induced overall lattice orientation change in the films. Furthermore, because the piezoelectric effect is related to the F-C-H molecular dipoles that are parallel to the b-axis of the P(VDF-TrFE) lattice,[4] Piezoresponse Force Microscopy (PFM) is used to probe the dipole orientation of individual grains,[5] and the orientation mapping is obtained. The results reveal that the polymer chains and the molecular dipoles show a distinct confinement induced cooperative lying-down orientation change, and ordered grains with highly anisotropic piezoelectric response are obtained.

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