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Morphology control of phase separated ferroelectric-semiconductor polymer blends for organic memory GREGORY SU, ANDREW JACOBS, EDWARD KRAMER, MICHAEL CHABINYC, Univ of California - Santa Barbara — The ability to store memory is essential for many electronic applications. All-organic memory devices based on a blend of a ferroelectric polymer and a semiconducting polymer have recently shown great promise for low-cost memory technology based on ferroelectricity. The thin film morphology of the phase separated ferroelectric-semiconductor polymer blend is critically important for working devices and improved operation. However, precise morphology control has so far been relatively unattainable. Here, we report on a new semiconducting polythiophene with a modified side chain structure (PEPT) that demonstrates a greatly improved phase separated morphology with the well-studied ferroelectric polymer poly[(vinylidenefluoride-co-trifluoroethylene] (PVDF-TrFE). Thin film surface and bulk characterization via microscopy, soft X-ray spectroscopy, and X-ray scattering experiments reveal that PEPT:PVDF-TrFE blends exhibit domain sizes that are easily tunable through simple parameters such as blend ratio. These results demonstrate progress toward achieving organic ferroelectric-semiconductor memory with optimized morphology and the techniques required for thorough thin film surface and bulk characterization.

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