Organic non-volatile memories from ferroelectric phase-separated blends

Asadi, Kamal; De Leeuw, Dago M.; De Boer, Bert; Blom, Paul W. M.

Published in:
Nature Materials

DOI:
10.1038/nmat2207

Supplementary Information

Organic non-volatile memories from ferroelectric phase separated blends

Kamal Asadi[1], Dago M. de Leeuw[1,2], Bert de Boer[1], and Paul W. M. Blom[1]

[1]*Zernike Institute for Advanced Materials, University of Groningen, Nijenborgh 4, NL-9747 AG, Groningen, The Netherlands.*

[2]*Philips Research Laboratories, High Tech Campus 4, NL-5656AE, Eindhoven, The Netherlands.*

The morphology of the bulk heterojunction based on P(VDF-TrFE):P3HT (10:1) was investigated with a scanning near-field optical microscope of WiTec (Alpha SNOM) that simultaneously records the topography (Fig. 1a) and the transmitted light intensity at λ=454 nm (Fig. 1b). Figure 1 demonstrates the phase separation into interpenetrating networks on the order of several tens to several hundreds of nanometers.

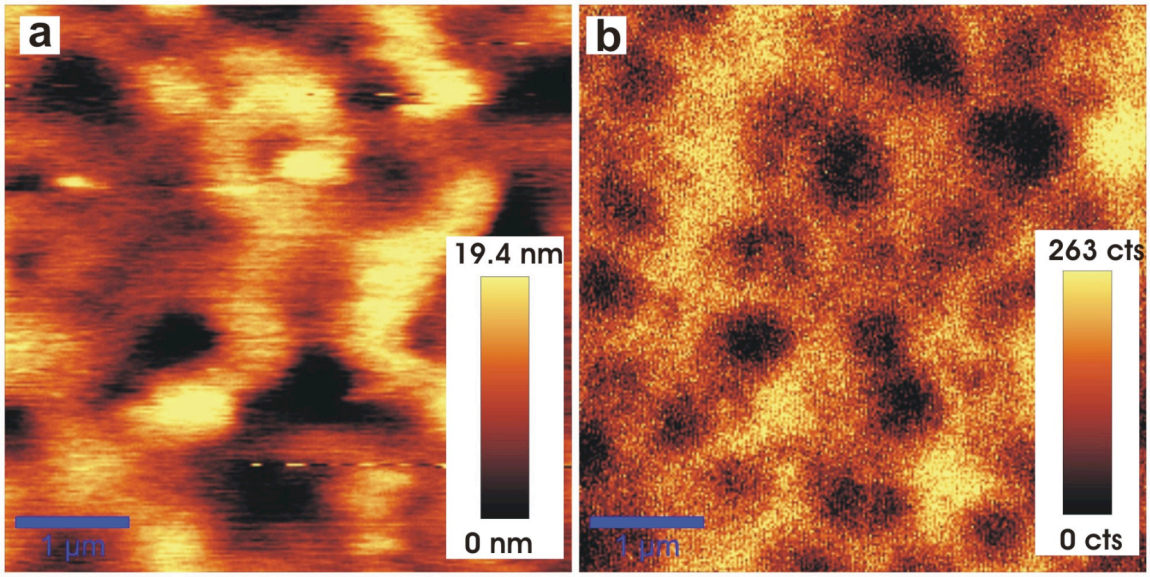

Figure 1 *Scanning near-field optical microscopy images of the topography (**a**) and of the transmitted light intensity (**b**) of a spin coated blend of P(VDF-TrFE):P3HT (10:1).*

Further investigations of the interfacial morphology was conducted with atomic force microscopy (NanoScope IV-Veeco Instruments). The results (Fig. 2) clearly shows the formation of the two different phases at the interface, where the uniform phase is the region-random, non-crystalline P3HT, and the crystalline phase is P(VDF-TrFE) which is formed upon annealing of the blend. These results demonstrate the phase separation on a length scale of hundreds of nanometers.

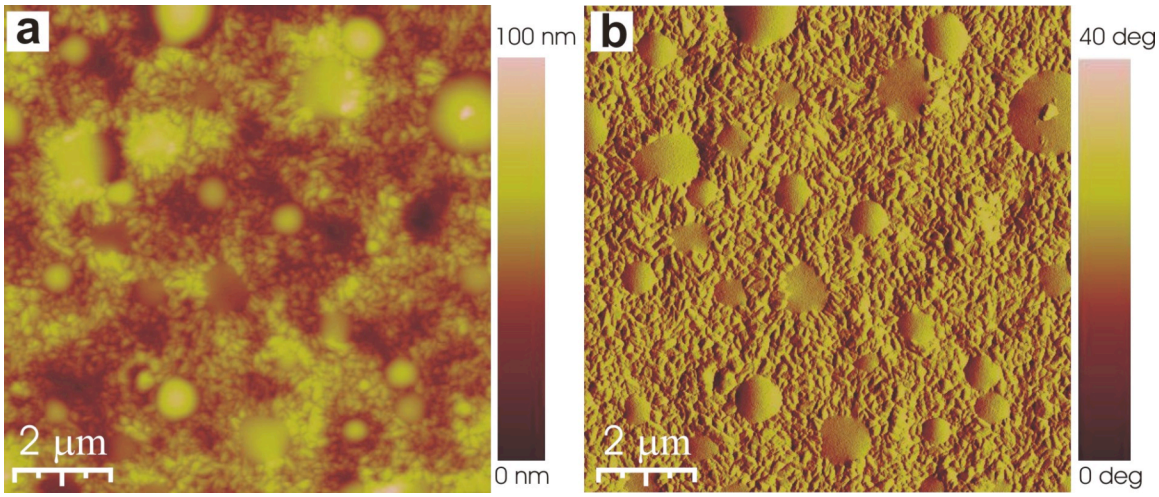

Figure 2 *Atomic force microscopy images of the topography (**a**) and of the phase (**b**) of a spin coated blend of P(VDF-TrFE):P3HT (10:1).*