Supporting Information

Formation of Nanopatterned Polymer Blends in Photovoltaic Devices

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Materials: Regioregular P3HT (M_w 8.7×10^4) for imprinted PV cells was from Merck Chemicals and used after being purified by Soxhlet extraction. Regioregular P3HT (M_w 5.0×10^4) for blend control cells was used as received from Rieke Metal. F8TBT (M_w 5.3×10^4) or synthesized in the Melville laboratory, University of Cambridge.

Device Fabrication: 65-85 nm thick P3HT and F8TBT films were spun cast from $CHCl_3$ solution (both 10 mg ml^{-1}) on PEDOT:PSS coated ITO/glass substrates and Si or Kapton polyimide film substrates coated with thermally evaporated Al cathode (80 nm thick), respectively. Solvent-vapor assisted nanoimprint lithography (SANIL) on P3HT films used a sequence of swelling by saturated $CHCl_3$ vapor : nitrogen (9:1) flow (50sccm) for 30-50 minutes, imprinting at room temperature by Si mold for 20 min, and then quenching by N_2 flow (20 sccm) for 60 min, followed by annealing at 120 °C for 5 minutes in glove box to remove residual solvent. Subsequently, F8TBT was imprinted by pre-patterned P3HT film using SANIL in the same procedure with saturated CH_2Cl_2 vapor: N_2 (9:1) flow (50sccm). Imprinted PV cells were annealed at 120 ºC for 10 minutes after cathode deposition. A blend control device was fabricated by spincoating 70 nm thick P3HT:F8TBT blend film from xylene solution (7.5mg ml^{-1} for both P3HT and F8TBT), followed by thermal evaporation of 100 nm Al electrode and subsequent post-annealing at 140 ºC for 10 minutes. All devices were encapsulated by epoxy resin in glove box for measurements.

Device Testing: Current-voltage (J-V) characteristics were measured in air at room temperature using a Keithley 237 source-measure unit. The photocurrent spectra were recorded with illumination from a Xenon lamp dispersed through a single-grating monochromator. The current-voltage characteristics under AM1.5G illumination were measured using a solar simulator (Oriel Instruments 81160) at an intensity equivalent to 100 mW/cm^2 after correction for spectral mismatch.