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Data Article

Data on the detail information of influence of substrate temperature on the film morphology and photovoltaic performance of non-fullerene organic solar cells

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ABSTRACT

This data contains additional data related to the article "Influence of Substrate Temperature on the Film Morphology and Photovoltaic Performance of Non-fullerene Organic Solar Cells" (Jicheng Zhang et al., In press) [1]. Data include measurement and characterization instruments and condition, detail condition to fabricate norfullerene solar cell devices, hole-only and electron-only devices. Detail condition about how to control the film morphology of devices via tuning the temperature of substrates was also displayed. More information and more convincing data about the change of film morphology for active layers fabricated from different temperature, which is attached to the research article of "Influence of Substrate Temperature on the Film Morphology and Photovoltaic Performance of Non-fullerene Organic Solar Cells" was given.

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Specifications Table

Subject area	Chemistry
More specific subject area	Non-fullerene acceptors for organic solar cells
Type of data	image, text file, figure
How data was acquired	^{1}H and ^{13}C NMR spectra were recorded on a Bruker AV 400 spectrometer. UV-visible absorption spectra were measured on a PerkinElmer UV–vis spectrometer model Lambda 750. Atomic force microscopy (AFM) measurements were conducted under ambient conditions using a Digital Instrument Multimode Nanoscope IIIA using the tapping mode. The thickness of the blend films was measured by a Dektak 6 M surface profilometer. XRD experiments were performed with an X' Pert PRO MPD instrument. The electrochemical behaviour of the polymers was studied using cyclic voltammetry (CHI 630 A Electrochemical Analyzer) with a three-electrode electrochemical cell in a 0.1 M Bu4NPF6 CH3CN solution under an atmosphere of nitrogen with a scanning rate of 0.1 V/s. A glassy carbon working electrode, a Pt wire counter electrode and an $Ag/AgNO_3$ (0.01 M in CH3CN) reference electrode were used. The ferrocene/ferrocenium (Fc/Fc+) redox couple was used as the internal reference standard. Current-voltage (I-V) and external quantum efficiency (EQE) measurements were conducted in air without encapsulation. The I-V characteristics were recorded at room temperature using an Agilent B2902A Source Meter under the illumination of an AM1.5 G AAA class solar simulator (model XES-301S, SAN-EI) with an intensity of 100 mW cm^{-2}, and the white light intensity was calibrated with a standard single-crystal Si solar cell.
Data format	analyzed
Experimental factors	A mixture of **PCDTBT-C12** and **NI-T-C8** in 1,2-dichlorobenzene (DCB) was firstly stirred at 90 °C overnight to ensure sufficient dissolution. To achieve a purpose substrate temperature, the substrates and micro pipette tips were elevated to 30 or 45 °C by storage on a hotplate for 5 min, then the donor/acceptor mixed solutions were quickly pipetted to a heated substrate and spin-coated to form an active layer.
Experimental features	Tuning the aggregation of small molecular acceptors when blended with donor materials via control the temperature of substrates.
Data source location	Beijing Normal University of China, Beijing, China
Data accessibility	Data is within this article.

Value of the data

- Detail information about how to control the temperature of substrates to tune the aggregation of acceptors in the active layers.
- Give more convincing data for the film morphology analysis of blend films fabricated from substrates with different temperature.
- Give detail information about how to fabricate non fullerene solar cells, hole-only and electron-only devices.

1. Data

The data include GPC results of ***PCDTBT-C12***,(Fig. 1) TGA images of ***PCDTBT-C12*** (Fig. 2)and ***NI-A-C8***, DSC images of ***NI-A-C8***,(Fig. 3) Cyclic voltammetry curves (Fig. 4)of ***PCDTBT-C12*** and ***NI-T-C8***, $J^{1/2}$–V