Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Polymer electronic composites that heal by solvent vapour

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Table S 1. Molecular weight of the components used in the conducting polymer composite.

Component	M_w (g/mol)	M_n (g/mol)	PDI
PDMS-urea	27900	14700	1.9
P3HT	131000	26300	5.0

Figure S 1. Photograph of 30 wt% P3HT composite in THF (total polymer concentration of 3 wt%).

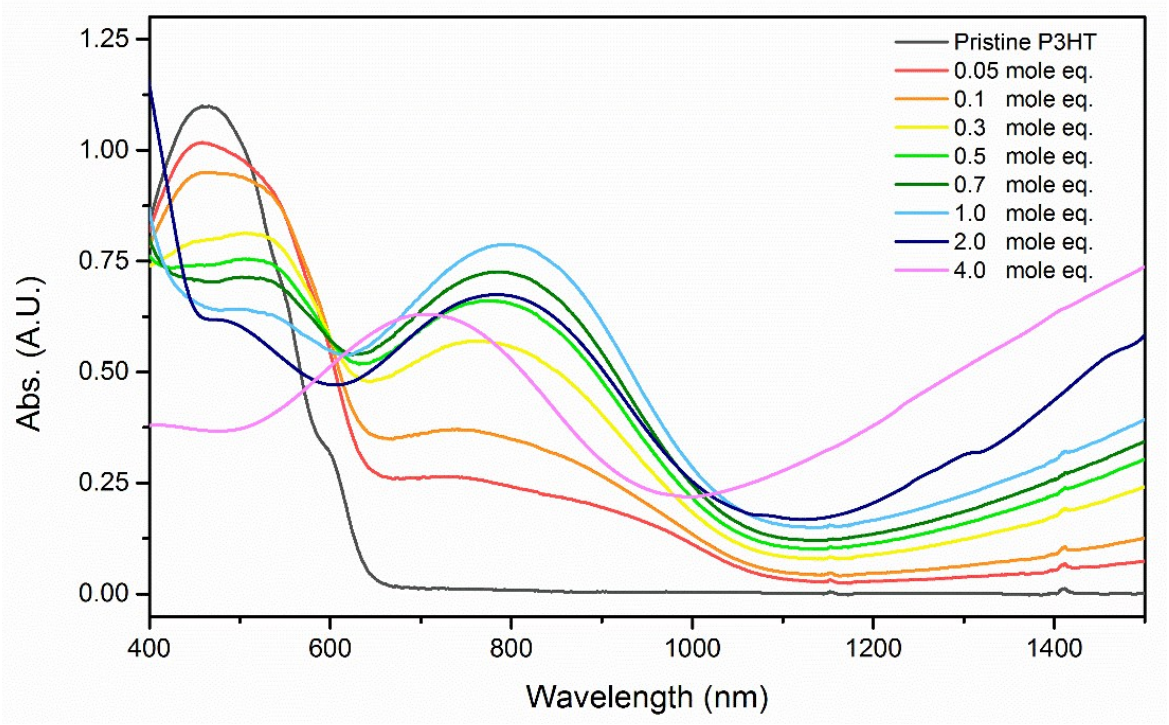

Figure S 2. Solution doping of dilute P3HT solution in chloroform with various mole equivalence of $FeCl_3$.

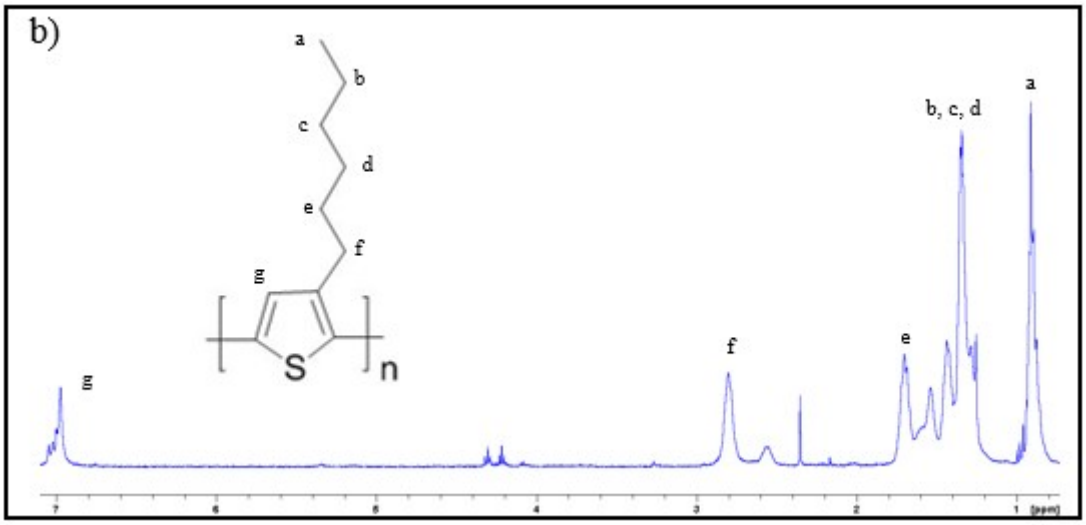

Figure S 3. ^1H NMR of P3HT in $CDCl_3$.

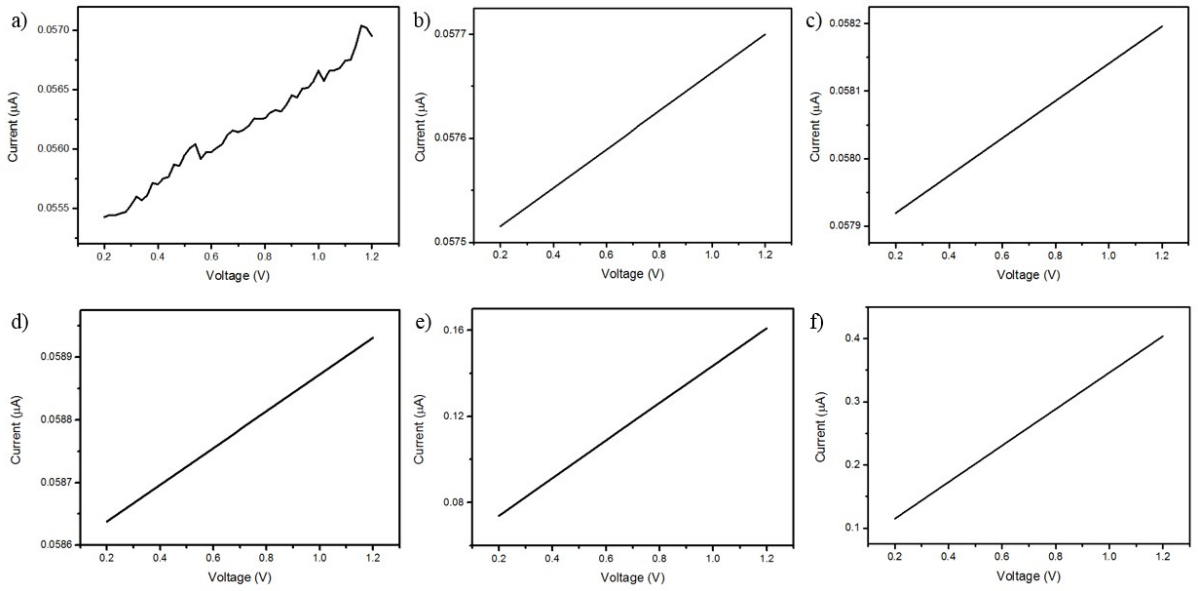

Figure S 4. Current-voltage curves for a) 10, b) 30, c) 50, d) 70, e) 90, f) 100 wt% P3HT composite thin films prepared on ITO coated glass. Total polymer concentration of 3 wt% in THF was used to spin coat thin films.

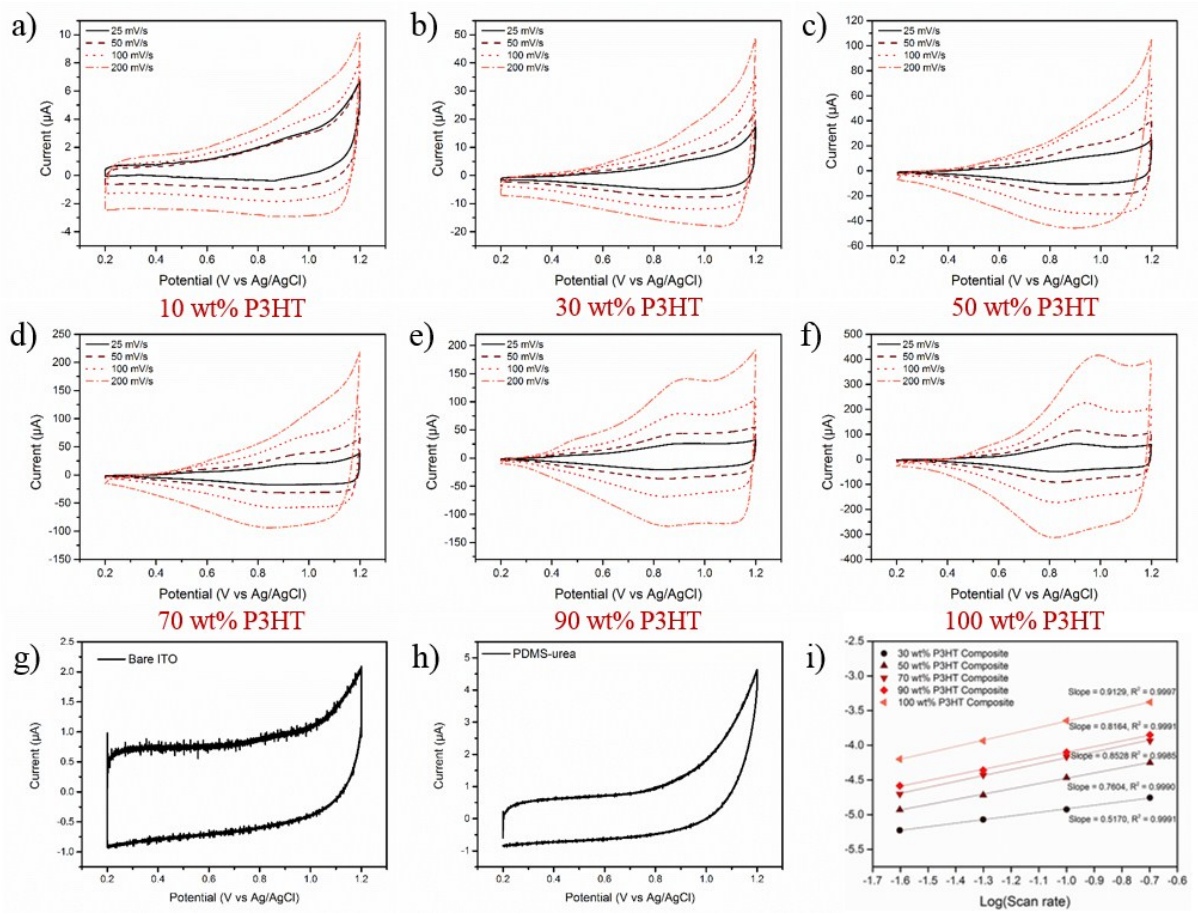

Figure S 5. Cyclic voltammograms of a) 10, b) 30, c) 50, d) 70, e) 90, f) 100 wt% P3HT composite thin films prepared on ITO coated glass, g) bare ITO electrode, h) pristine PDMS-urea. Total polymer concentration of 3 wt% in THF was used to spin coat thin films. Applied potential between +0.2 and +1.2 V in 0.1 M TBAHFP in MeCN. i) Linear dependence of log of scan rate over log of current of composite thin films with various weight fractions (30 to 100 wt%) of P3HT.

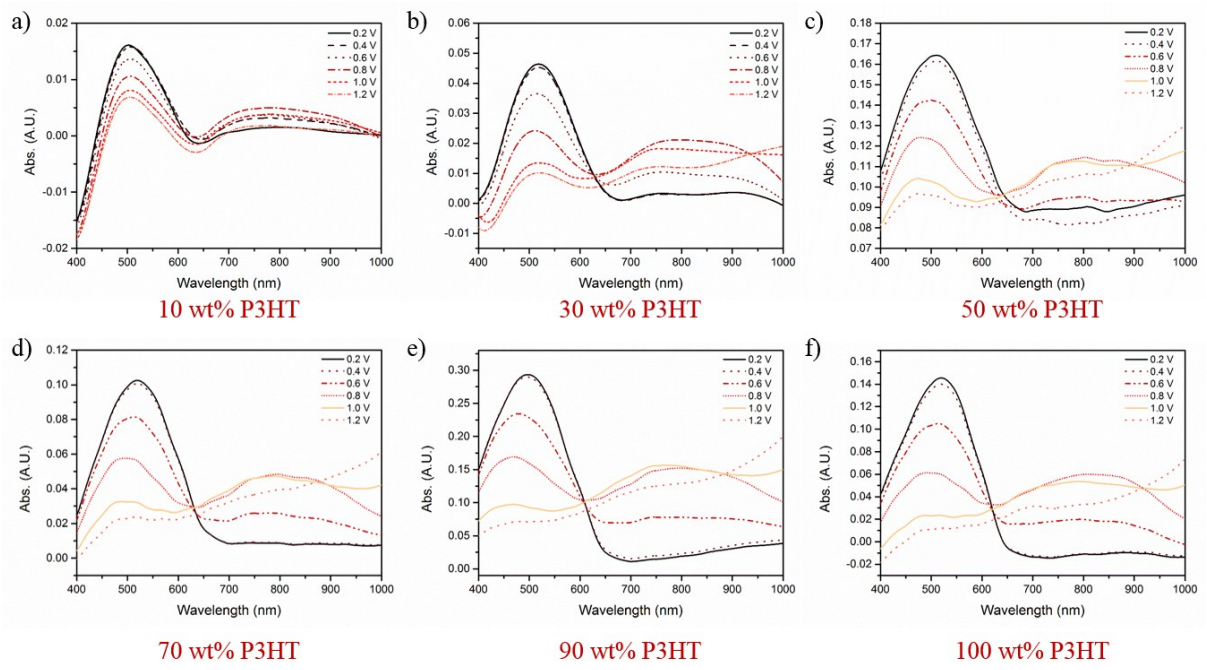

Figure S 6. Spectroelectrochemistry of a) 10, b) 30, c) 50, d) 70, e) 90, f) 100 wt% P3HT composite thin films prepared on ITO coated glass. Total polymer concentration of 3 wt% in THF was used to spin coat thin films. The applied potential was between +0.2 and +1.2 V in 0.1 M TBAHFP in MeCN.

Surface chemistry

In order to find the optimal surface for spin coating of the composite films, various substrates of surface chemistry were analysed by water contact angle measurements (**Figure S6**). The composite thin films showed good adhesion on hydrophobic surfaces, such as of bis(trimethylsilyl)amine silanised glass and indium tin oxide (ITO)-coated glass with an average water contact angle of 75.9 ± 1.38^{o} and 82.3 ± 3.55^{o}, respectively (**Table S2**). Thus for conductivity measurements, composite films were deposited between two parallel gold contacts on HMDS-silanised glass substrates, whereas ITO-coated glass was used for electrochemical studies.

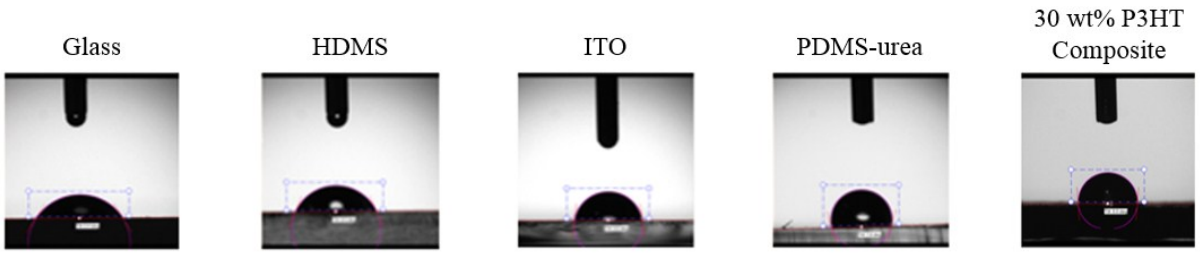

Figure S 7. Water contact angle of various substrates, PDMS-urea and the 30 wt% P3HT composite.

Table S 2. Contact angle measurements on various substrates.

	Glass	HMDS	ITO	PDMS-urea	30 wt% P3HT composite
Contact angle	55.3 ± 2.39	75.9 ± 1.38	82.3 ± 3.55	106 ± 1.01	97.5 ± 2.53