

## Supporting Information

### Highly Efficient Plasmonic Organic Optoelectronic Devices Based on a Conducting Polymer Electrode Incorporated with Silver Nanoparticles

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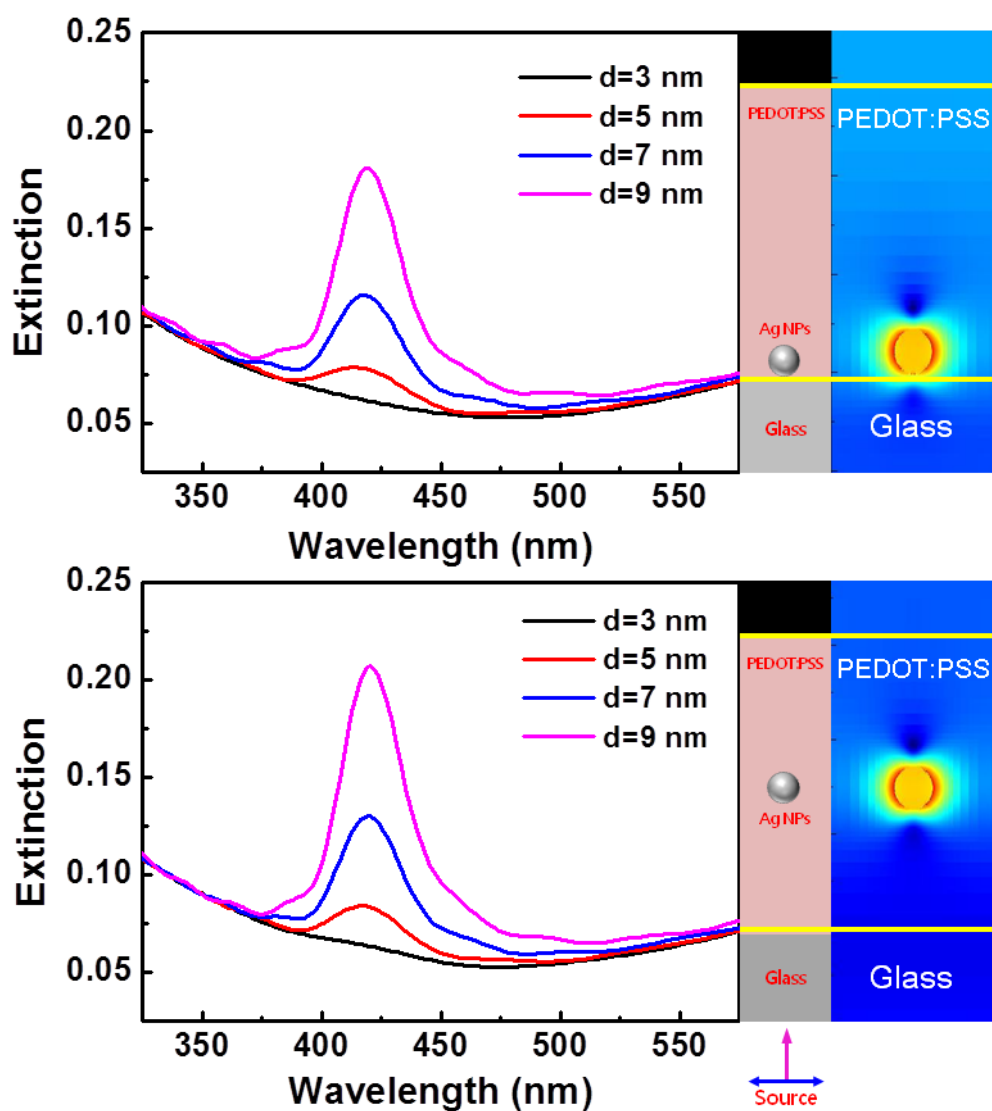
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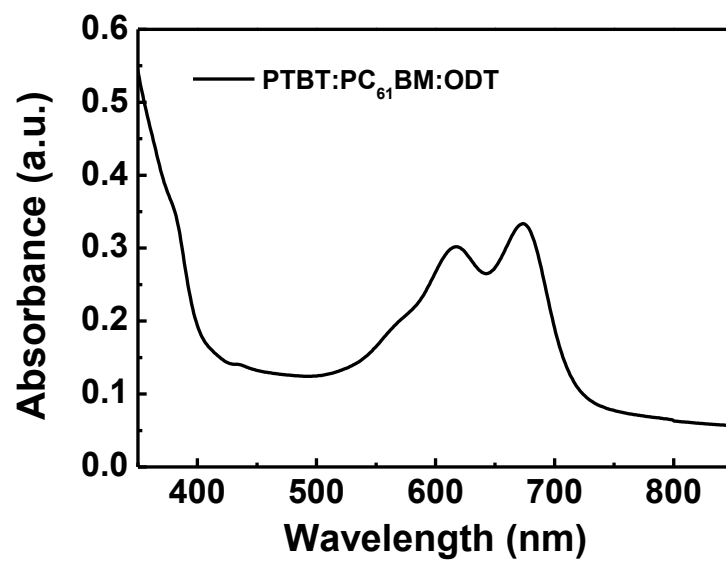
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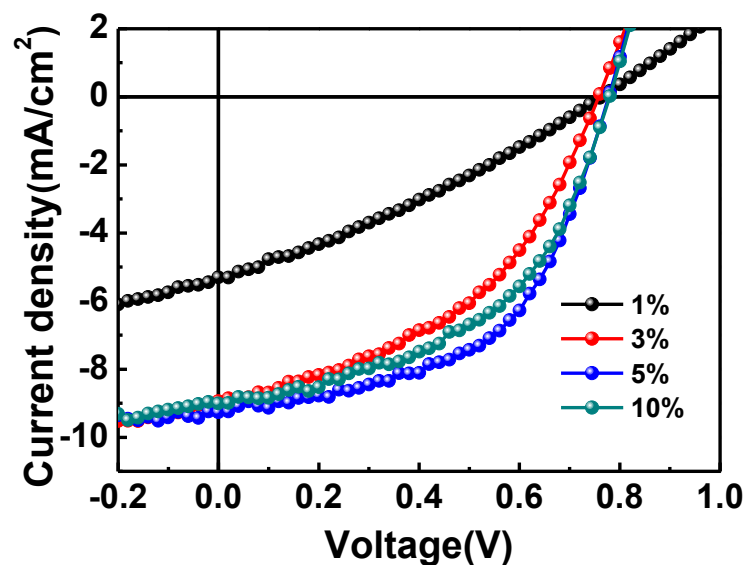
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**Fig. S1** Simulated extinction spectra of Ag NPs with a size of 3-9 nm and electromagnetic field distribution around Ag NPs at the bottom and center position from a glass substrate.



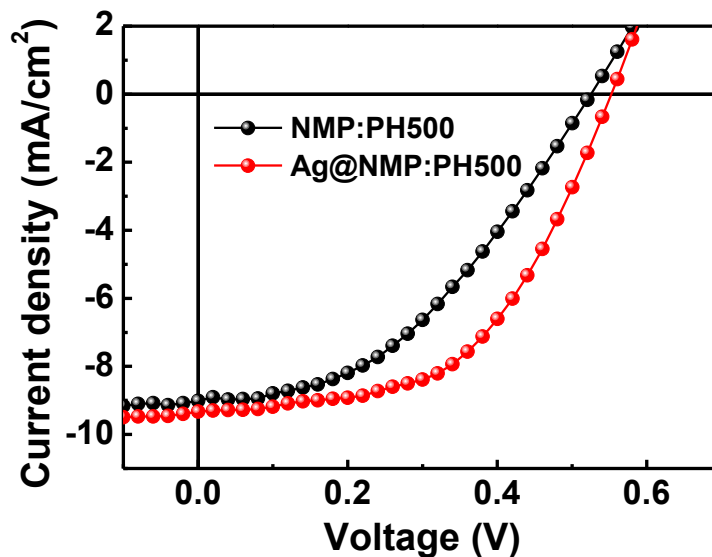
**Fig. S2** Absorption spectrum of active layer (PTBT:PC<sub>61</sub>BM:ODT).



**Fig. S3** *J-V* characteristics of ITO-free PTBT:PC<sub>61</sub>BM-based PSCs with Ag@NMP:PH500 electrodes by increasing concentration of Ag NPs.

**Table S1** Summary of device properties of ITO-free PTBT:PC<sub>61</sub>BM-based PSCs with Ag@NMP:PH500 electrodes by increasing concentration of Ag NPs.

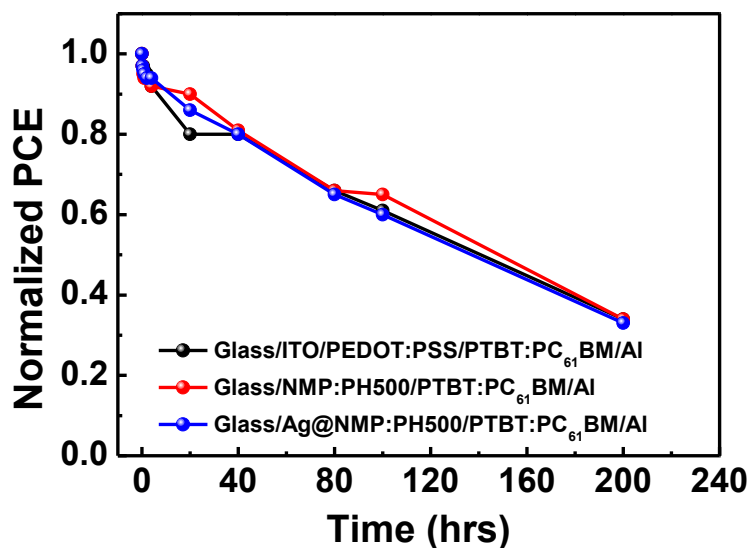
Device configuration	Concentration of Ag NPs	$J_{SC}$ (mA cm <sup>-2</sup> )	$V_{OC}$ (V)	$FF$	PCE (%)
Glass/Ag@NMP:PH500/PTBT:PC <sub>61</sub> BM/Al	1%	5.30	0.76	0.30	1.21
	3%	8.93	0.76	0.45	3.03
	5%	9.26	0.78	0.53	3.85
	10%	9.00	0.78	0.49	3.44



**Fig. S4** *J-V* characteristics of ITO-free P3HT:PC<sub>61</sub>BM-based PSCs with NMP:PH500 and Ag@NMP:PH500 electrodes.

**Table S2** Summary of device properties of ITO-free P3HT:PC<sub>61</sub>BM-based PSCs.

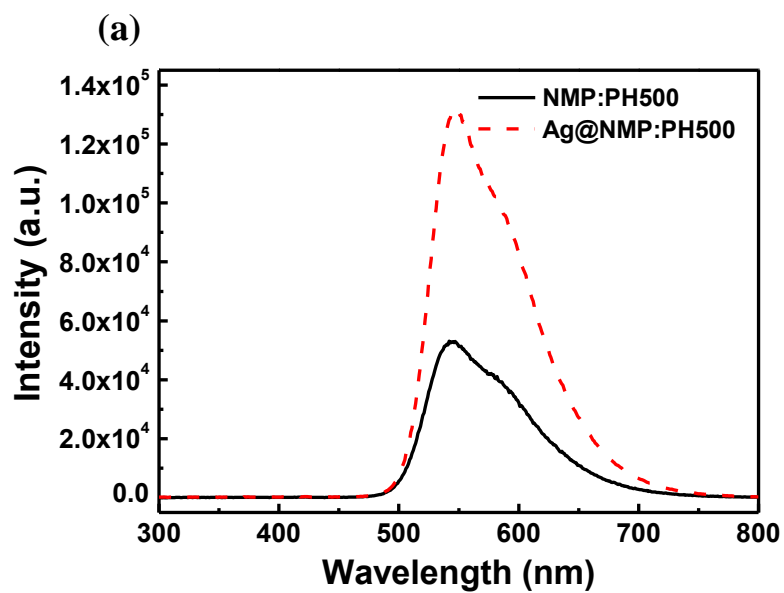
Device configuration	$J_{sc}$ (mA cm <sup>-2</sup> )	$V_{oc}$ (V)	$FF$	PCE (%)
Glass/NMP:PH500/ P3HT:PC <sub>61</sub> BM/Al	8.89	0.54	0.43	2.00
Glass/Ag@NMP:PH500/P3HT:PC <sub>61</sub> BM/Al	9.34	0.55	0.53	2.74



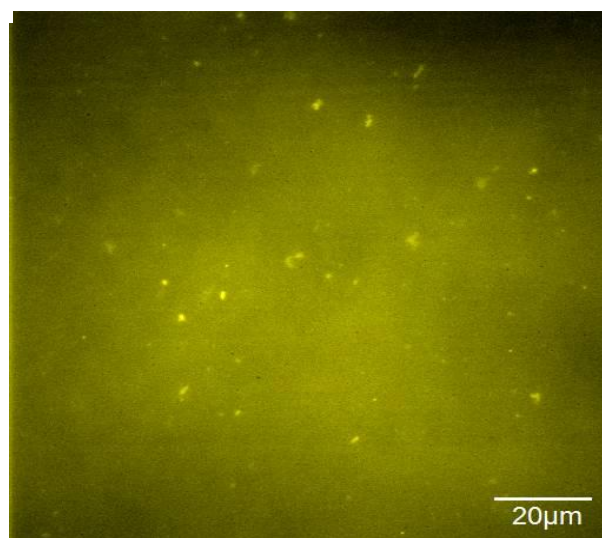
**Fig. S5** Temporal stabilities of devices with ITO, NMP:PH500 and Ag@NMP:PH500 electrodes.

**Table S3** Summary of device properties of ITO-coated and ITO-free PTBT:PC<sub>61</sub>BM-based PSCs on PET substrate.

Device configuration	$J_{SC}$ (mA cm <sup>-2</sup> )	$V_{OC}$ (V)	$FF$	PCE (%)
PET/ITO/PEDOT:PSS/PTBT:PC <sub>61</sub> BM/Al	9.00	0.87	0.44	3.40
PET/NMP:PH500/PTBT:PC <sub>61</sub> BM/Al	7.50	0.66	0.31	1.55
PET/Ag@NMP:PH500/PTBT:PC <sub>61</sub> BM/Al	8.22	0.64	0.39	2.06



(b)



**Fig. S6** (a) Photoluminescence spectra of SY films on NMP:PH500 and Ag@NMP:PH500 electrodes and (b) confocal laser scanning microscopy image of SY film on Ag@NMP:PH500.