Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.
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Supporting Information

Aligned Silver Nanowires as Transparent Conductive Electrodes for Flexible Optoelectronic Devices

Fan Wu[abc], Zidong Li[abc], Feng Ye[ab], Xiaoli Zhao[ab*], Tong Zhang[abc], and Xiaoniu Yang[ab*]

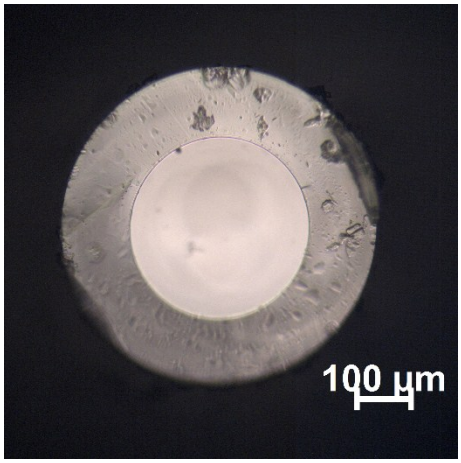

Figure S1. Optical microscopy image of glass capillary with 300 μm inner diameter.

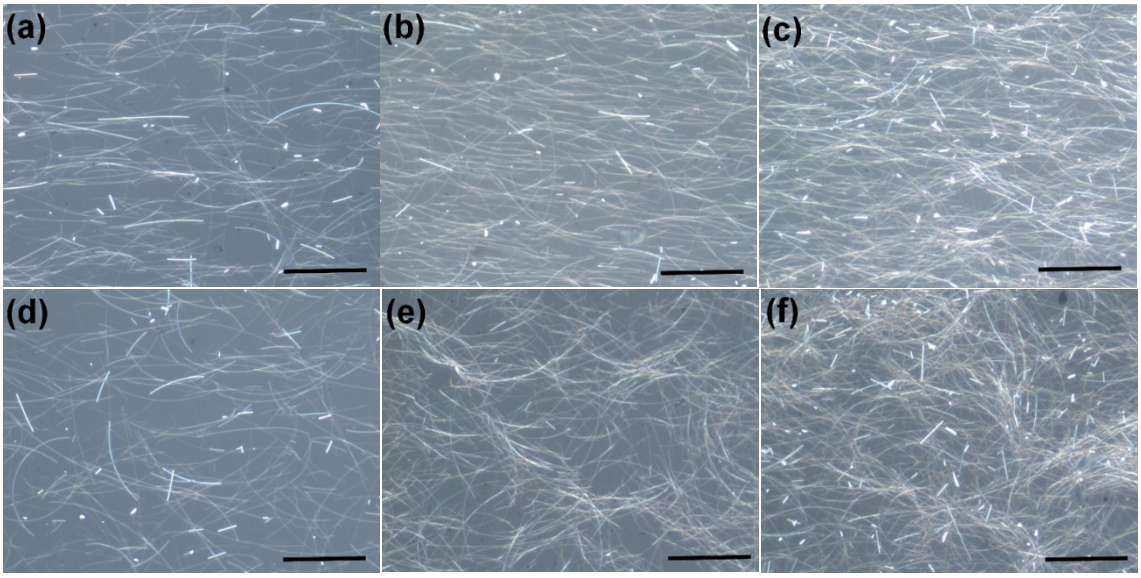

Figure S2. Optical microscopy image of AgNW films prepared by the CFA technique. The concentration of AgNW solutions are (a), (d) 5 mg ml^{-1}, (b), (e) 10 mg ml^{-1}, and (c), (f) 15 mg ml^{-1}. The printing speeds are (a)-(c) 10 mm s^{-1} and (d)-(f) 1 mm s^{-1}. The mean length of the nanowires is 150 µm. All scale bars are 25 µm.

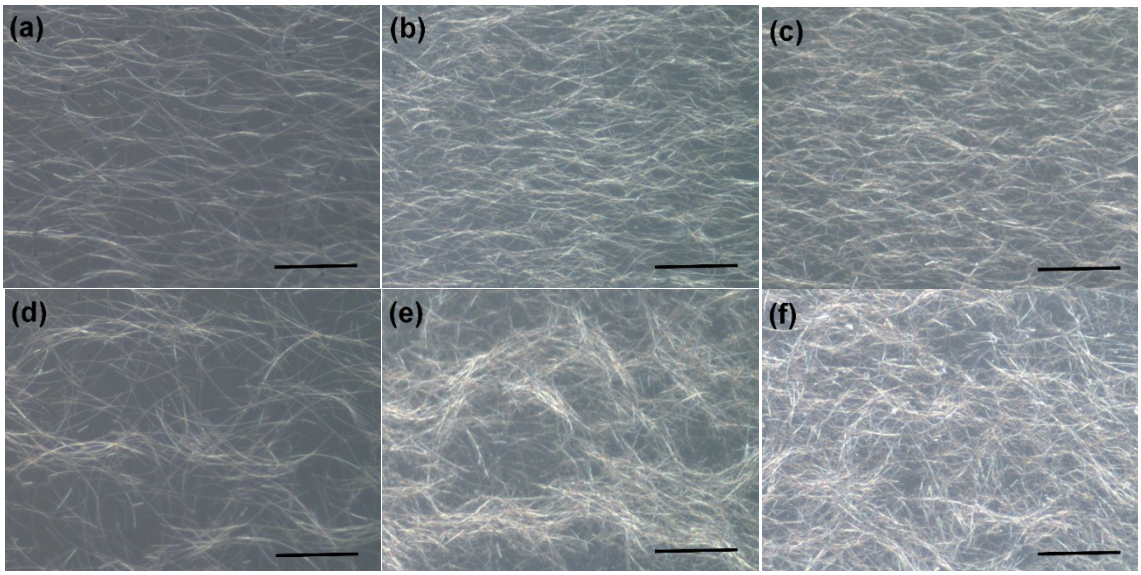

Figure S3. Optical microscopy image of AgNW networks prepared by the CFA technique. The concentration of the AgNW solutions are (a), (d) 5 mg ml^{-1}, (b), (e) 10 mg ml^{-1}, and (c), (d) 15 mg ml^{-1}. The printing speeds are (a)-(c) 10 mm s^{-1} and (d)-(f) 1 mm s^{-1}. The mean length of the nanowires is 28 µm. All scale bars are 25 µm.

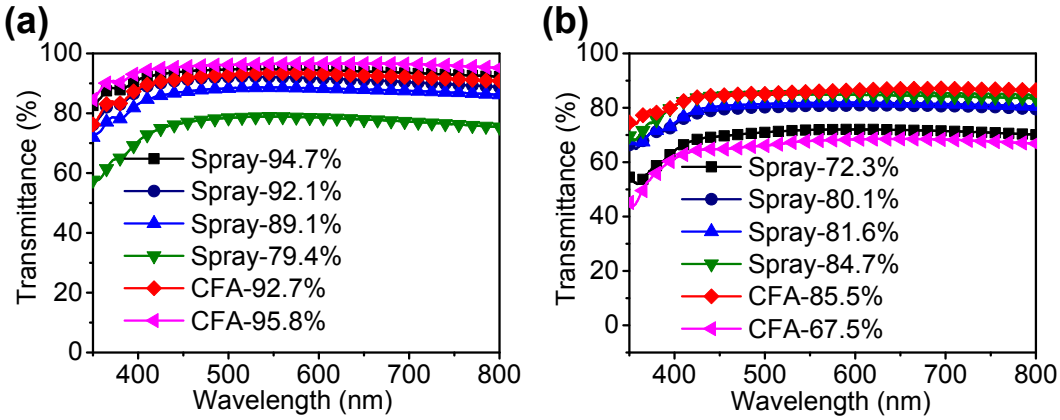

Figure S4. Transmission spectra of (a) 150 μm and (b) 28 μm AgNW networks prepared by spray-coating and CFA techniques.

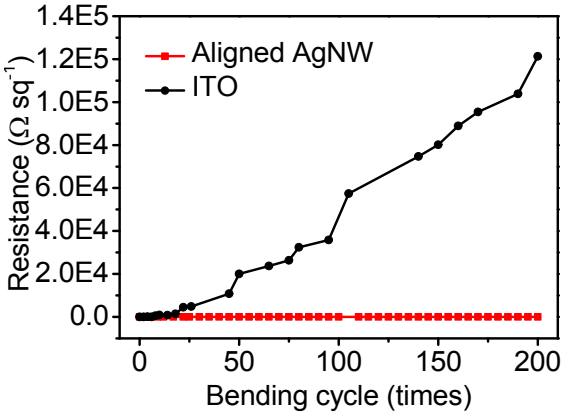

Figure S5. The resistance change of aligned AgNWs and ITO on PET substrates as a function of the number of bending cycles with a bending radius of 7 mm during compressive bending. The mean length of the nanowires is 150 μm.

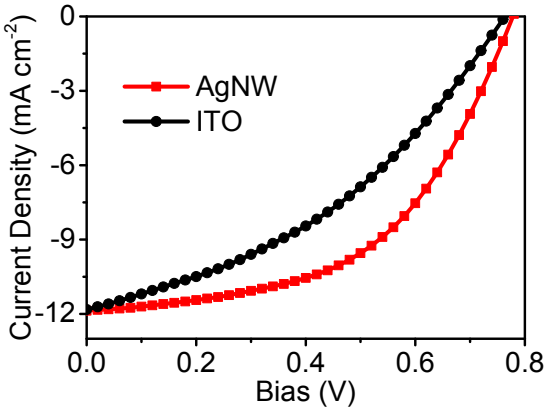

Figure S6. *J-V* characteristics of flexible devices based on ITO and aligned AgNW electrodes.

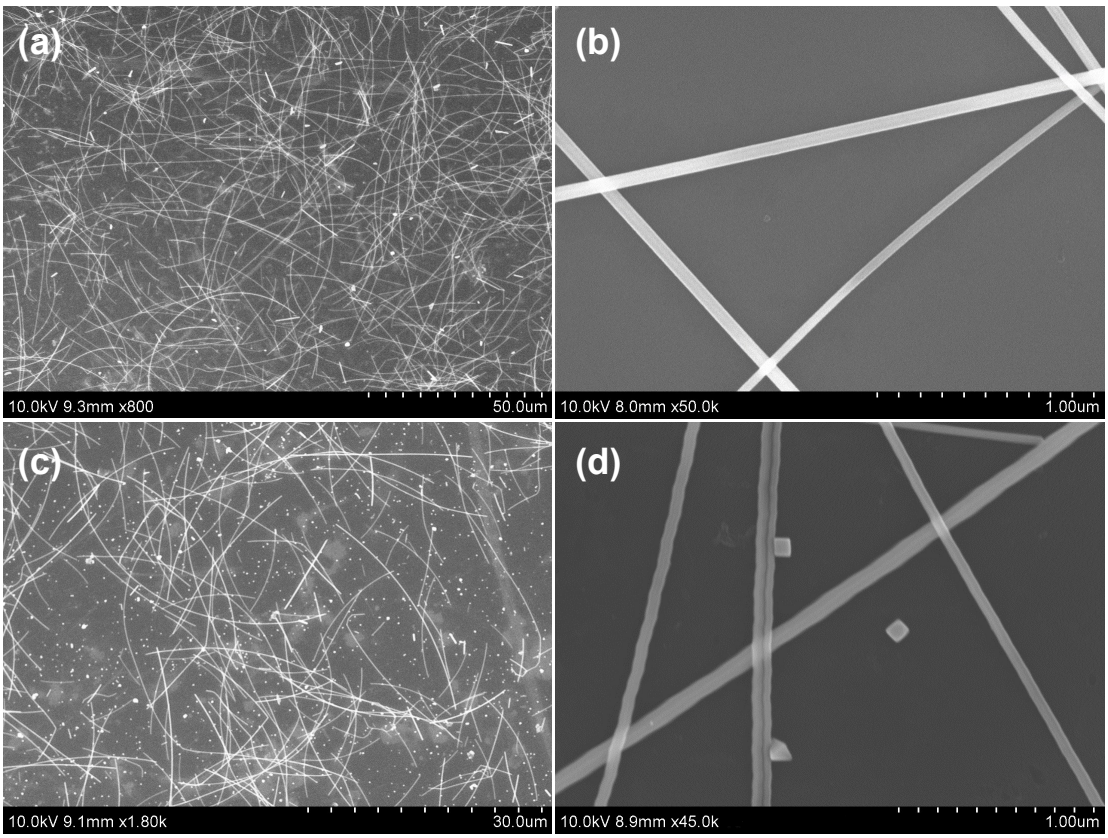

Figure S7. SEM images of the supplied AgNWs. The length and diameter of the wires are (a), (b) 100-200 μm and 50 nm ± 10 nm, (c), (d) 20-35 μm, and 40 nm ± 10 nm, respectively.

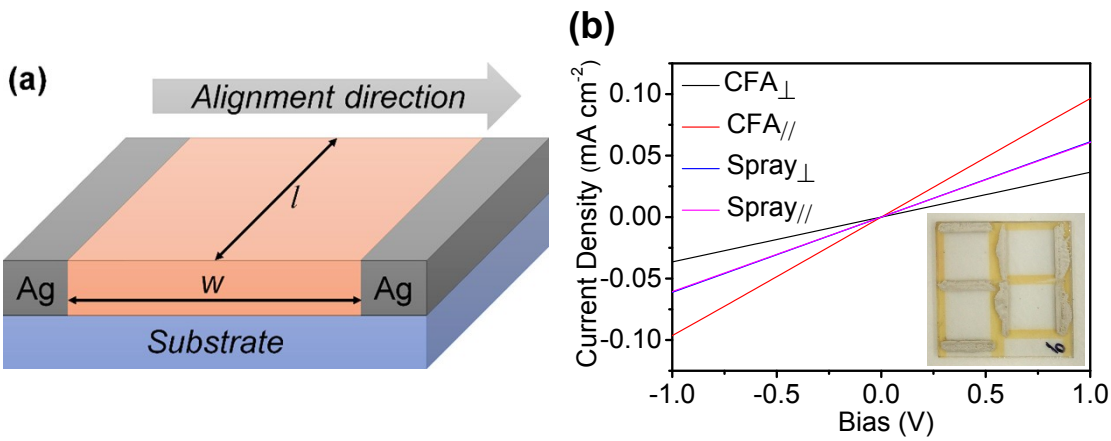

Figure S8. (a) Scheme: Sheet resistance measurement of transparent conductors using the two-probe method, (b) *J-V* characteristics of the sample for sheet resistance measurement. The inset shows a sample for the measurement.

The conductivity was calculated according to Ohm's law (eqn (1)):

$$\sigma = Iw/Vdl$$

Where σ, *I, w, V, d, l* represent the conductivity, current injected, width of the conductor (10 mm), voltage read out, thickness of the conductor, and length of the

conductor (10 mm).

Here *l*=*w*, this lead to (eqn (2)):

$$Rs = \rho/d = 1/\sigma d$$

Where *Rs* and ρ represent the sheet resistance and the resistivity.

Then we acquired (eqn (3)) according to (eqn (1)) and (eqn (2)):

$$Rs = U/I$$

And, the sheet resistance could be calculated from the slope of the *J-V* curve.

Table S1. Comparison of performance for previously reported AgNW/ITO-based PSCs with different active areas.

TCEs	Active layer materials	Area cm^2	*Jsc* mA cm^{-2}	*Voc* V	FF	PCE %	Reference
AgNW	PBnDT-DTffBT	0.12	9.64	0.59	0.48	2.8	ACS Appl. Mater. Interfaces 2011[1]
	PTB7-F20	0.36	14.40	0.67	0.59	5.80	Adv. Funct. Mater. 2013[2]
	PTB7	0.38	16.55	0.74	0.61	7.57	Nano Res. 2014[3]
	PTB7	0.11	12.7	0.72	0.48	4.47	Nanoscale 2014[4]
	PTB7	0.38	16.15	0.74	0.61	7.42	Energy Environ. Sci 2015[5]
	P3HT	0.14	8.84	0.56	0.49	2.44	Adv. Funct. Mater. 2015[6]
	P2	0.15	13.54	0.78	0.62	7.42	Adv. Funct. Mater. 2015[7]
	PTB7	0.1	19.16	0.68	0.58	7.58	Small 2015[8]
	PTB7-Th	0.13	17.83	0.76	0.64	8.57	Nano Lett. 2015[9]
	PBDTTTz-4	57	6.3	0.41	0.42	1.9	Adv. Eng. Mater. 2016[10]
ITO	PTB7-Th	1.0	14.85	0.737	0.55	6.01 (in air)	Adv. Energy Mater.[11]
AgNW	**PTB7-Th**	**1.0**	**12.74**	**0.78**	**0.60**	**6.01**	**Our work**

Table S2. Performance of devices using aligned AgNW (L_{mean}=150 μm) and ITO-coated electrodes on flexible substrates.

Electrode	Voc V	*Jsc* mA cm^{-2}	FF %	PCE %
Aligned AgNW	0.78	11.87	51.92	4.81
ITO	0.76	11.82	38.78	3.48

Reference

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