Supporting Information

Effective Work Function Modulation of SWCNT-AZO NP Hybrid Electrodes in Fully Solution-Processed Flexible Metal-Oxide Thin Film Transistor

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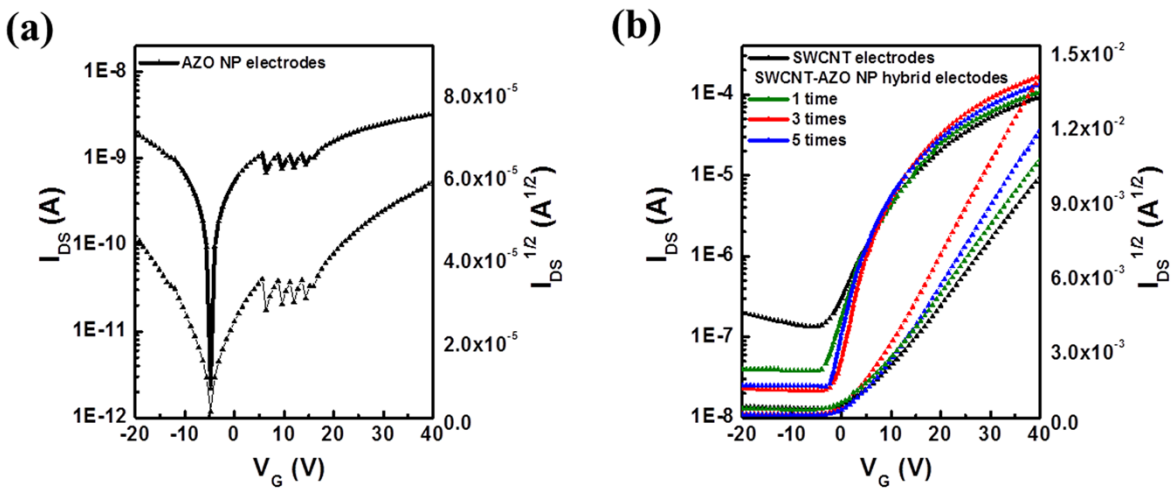

Fig. S1 Electrical characteristics of the TFTs with (a) the AZO NP and (b) the SWCNT-AZO NP hybrid electrodes as a function of the AZO NPs coating times.

Table S1. Summarized electrical properties of the TFT with the AZO NP and the SWCNT-AZO NP hybrid electrodes as a function of the AZO NPs coating times.

TFT Structure	Sub-threshold slope (V/decade)	Threshold voltage (V)	Field-effect mobility ($cm^2/V{\cdot}s$)	On/off current ratio
SWCNT/In_2O_3/SiO_2/p^{++}-Si	6.59	3.02	2.65	6.75×10^2
AZO NP/In_2O_3/SiO_2/p^{++}-Si	-	-	-	-
SWCNT-AZO NP hybrid/In_2O_3/SiO_2/p^{++}-Si (1 time of the AZO NP coating)	4.96	1.95	3.12	2.71×10^3
SWCNT-AZO NP hybrid/In_2O_3/SiO_2/p^{++}-Si (3 time of the AZO NP coating)	3.34	1.92	5.14	8.15×10^3
SWCNT-AZO NP hybrid/In_2O_3/SiO_2/p^{++}-Si (5 time of the AZO NP coating)	3.81	2.86	3.73	5.11×10^3

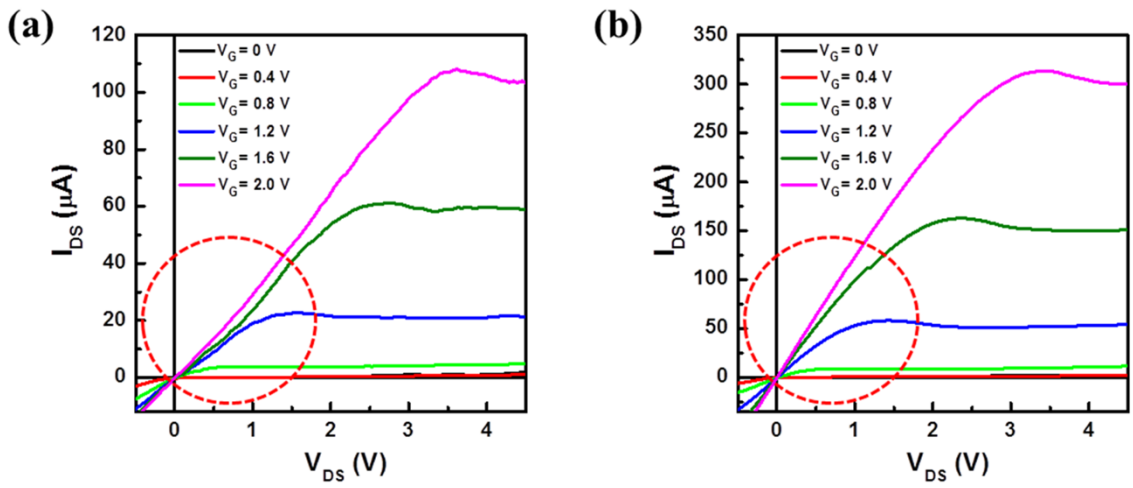

Fig. S2 Output characteristics of the TFTs with (a) the SWCNT and (b) the SWCNT-AZO hybrid electrodes with V_{GS} = 0 to 2 V in 0.4 V steps.

Table S2. Summarized electrical properties of the TFT with the SWCNT electrodes and the SWCNT-AZO NP hybrid electrodes and previous results for the TFTs with the SWCNT electrodes. HfO_2 = hafnium oxide, In_2O_3 = indium oxide, ITO-F = fluorine-doped indium tin oxide, IZO = indium zinc oxide, Si_3N_4 = silicon nitride, ZAZ = zirconium oxide/aluminium oxide/zirconium oxide, ZTO = zinc tin oxide.

TFT Structure	Sub-threshold slope (V/decade)	Threshold voltage (V)	Field-effect mobility ($cm^2/V{\cdot}s$)	On/off current ratio	Reference
Ag NW/IL-blended PVP /SWCNT/In_2O_3/Al_2O_3/PI	0.08	0.49	2.14	3.24×10^3	
Ag NW/IL-blended PVP /SWCNT-AZO NP hybrid /In_2O_3/Al_2O_3/PI	0.05	0.75	5.44	3.71×10^4	
SWCNT/ZTO/Si_3N_4 /ITO/glass	1.4	15	1.3	1.02×10^7	23
SWCNT/IZO/ZAZ /ITO–F/glass	0.735	2.92	0.45	1.01×10^6	24
SWCNT/In_2O_3/HfO_2 /ITO/glass	0.66	0.66	1.59	3.12×10^5	25
SWCNT-Al bilayer /In_2O_3/HfO_2/ITO/glass	0.47	0.45	4.50	6.86×10^5	25

Table S3. Summarized electrical properties of bending cyclic test of the TFT with the SWCNT-AZO NP hybrid electrodes at a radius of curvature of 3 mm.

TFT Structure	Bending cycles	Sub-threshold slope (V/decade)	Threshold voltage (V)	Field-effect mobility ($cm^2/V{\cdot}s$)	On/off current ratio
Ag NW/ IL-blended PVP /SWCNT-AZO NP hybrid /In_2O_3/Al_2O_3/PI	As	0.05	0.75	5.44	3.71×10^4
	10	0.08	0.79	5.31	5.71×10^4
	50	0.08	0.75	5.44	5.39×10^4
	100	0.07	0.80	5.55	1.11×10^5
	200	0.08	0.74	5.24	2.11×10^5
	500	0.05	0.78	5.23	8.66×10^4
	800	0.06	0.79	5.77	8.52×10^4
	1000	0.05	0.80	5.33	6.02×10^4