Supporting Information

Optical simulation

The optical transfer matrix of SWAW is: [1]

$$\begin{bmatrix} B \\ C \end{bmatrix} = \left\{ \prod_{j=1}^{4} \begin{bmatrix} \cos\delta_j & \frac{i}{\eta_j}\sin\delta_j \\ i\eta_j \sin\delta_j & \cos\delta_j \end{bmatrix} \right\} \begin{bmatrix} 1 \\ \eta_5 \end{bmatrix}, \quad \text{(S1)}$$

$$\eta_j = \begin{cases} N_j/\cos\theta_j & \text{For p-polarized wave} \\ N_j\cos\theta_j & \text{For s-polarized wave} \\ N_j & \text{For normal light incidence} \end{cases} \quad \text{(S2)}$$

where j = 0 (for incidence medium); 1, 2, 3 or 4 for SWAW layers; and 5 for the substrate layer. The angular phase thickness is $\delta_j = \frac{2\pi}{\lambda} N_j d_j \cos\theta_j$. θ_j is the angle of wave propagation in the layer as determined from Snell's law. N_j denotes the refractive index of each layer, at the incident wavelength λ. The physical thicknesses of the plate of WO_3 exposed to air, the Ag plate, the WO_3 plate and the SiO_2 plate on the glass substrate are represented by d_1, d_2, d_3, and d_4, respectively. The transmittance can be given as

$$T = \frac{4\eta_0\eta_5}{(\eta_0 B + C)^2}. \quad \text{(S3)}$$

Here, we only consider vertical incidence, thus, $\delta_j = \frac{2\pi}{\lambda} N_j d_j$, and $\eta_j = N_j$. Using data of Ag from the literature,[2] we can simulate the transmittance for SWAW with glass N_5=1.52 or PI N_5=1.75 as a substrate and under vertical incidence, by inputting j=1, 2, 3, 4, N_1=2.1, $N_2=n_2(\lambda)-ik_2(\lambda)$, N_3=2.1, N_4=1.46, N_5=1.52 (or N_5=1.75) using a computer.

References

1 A. Thelen, *Design of Optical Interference Filters,* 1989, McGraw-Hill, New York, p. 9.

2 D. R. Lide, *CRC handbook of chemistry and physics,* 2008, CRC, Boca Raton, p. 417.

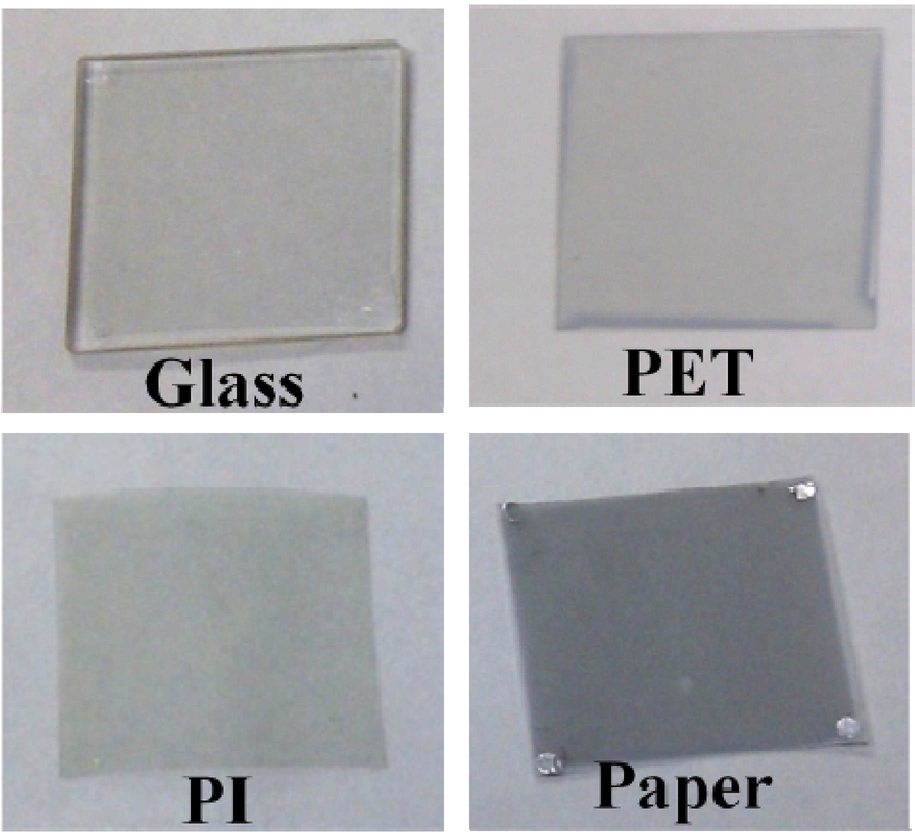

Figure S1. Photos of SWAW electrodes deposited on different substrates.

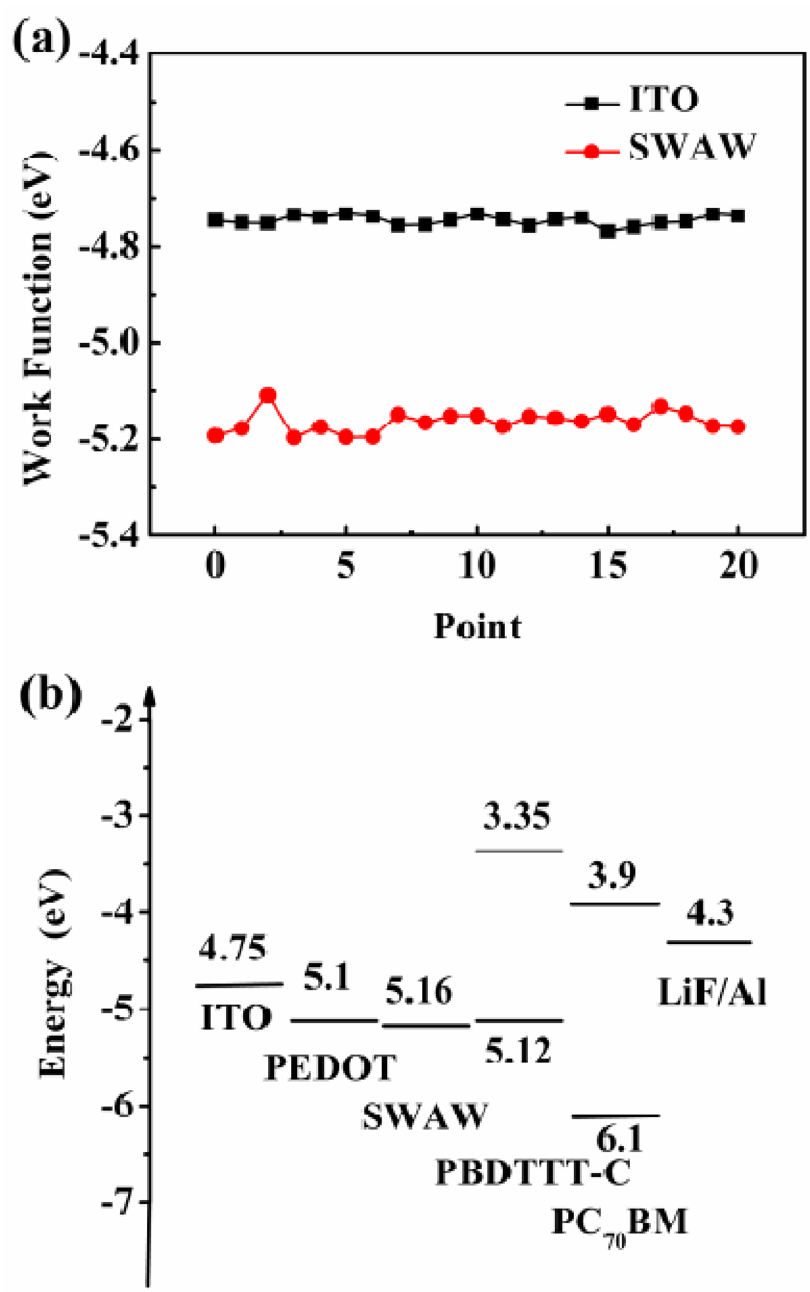

Figure S2. a) Work functions of ITO and SWAW. b) Energy level alignment of the polymer PV cells used in this study.

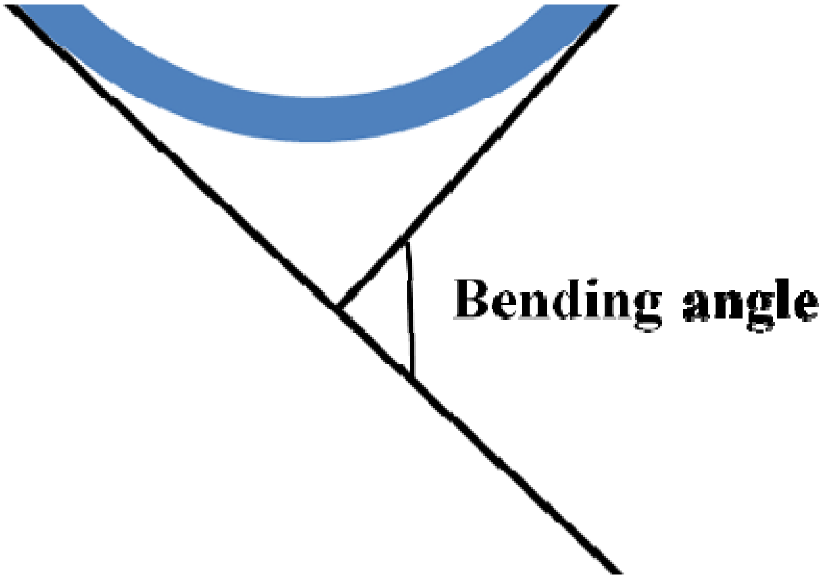

Figure S3. Diagram of the bending angle as defined in this paper.

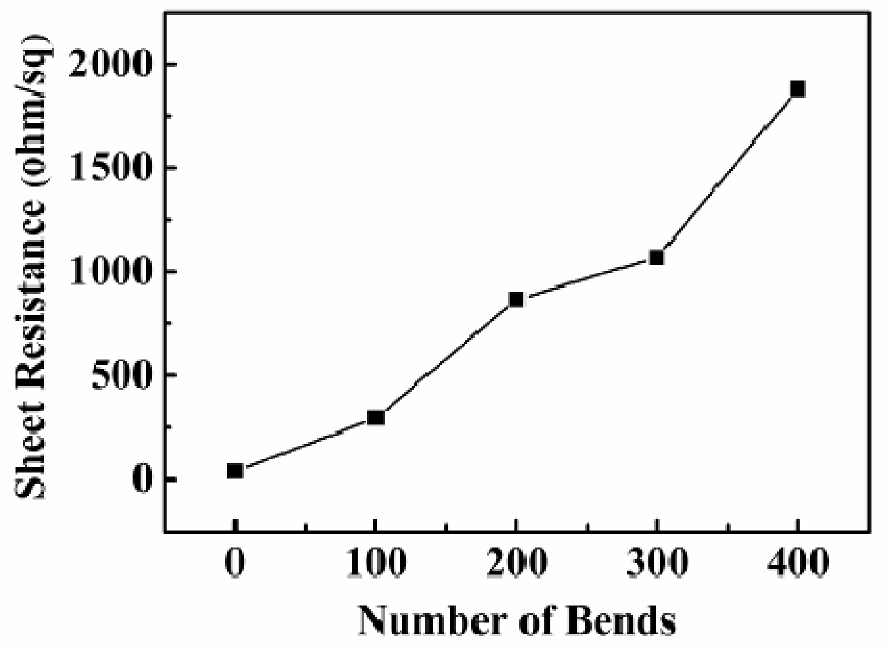

Figure S4. Sheet resistance of the PET/ITO flexible electrode as a function of the number of bends.

Table S1. Carrier concentrations, Hall mobilities and resistivities of the ITO and SWAW electrodes based on glass and PI substrates.

Samples	**Carrier Density [cm^{-3}]**	**Hall Mobility [$cm^2 V^{-1} s^{-1}$]**	**Resistivity [Ω·cm]**
Glass/ITO	-1.87×10^{21}	49.1	6.80×10^{-5}
Glass/SWAW	-6.531×10^{21}	13.2	7.25×10^{-5}
PI/SWAW	-6.595×10^{21}	13.0	7.29×10^{-5}
PET/SWAW	-5.832×10^{21}	6.75	1.59×10^{-4}
Paper/SWAW	-5.186×10^{21}	0.92	1.31×10^{-3}