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

Supplementary Information

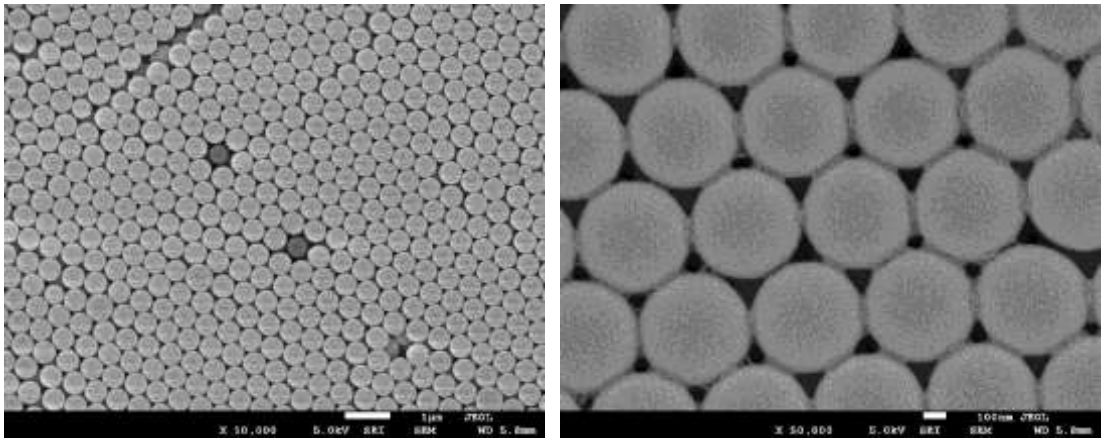

Figure S1. SEM images of self-assembled PS template of different magnifications

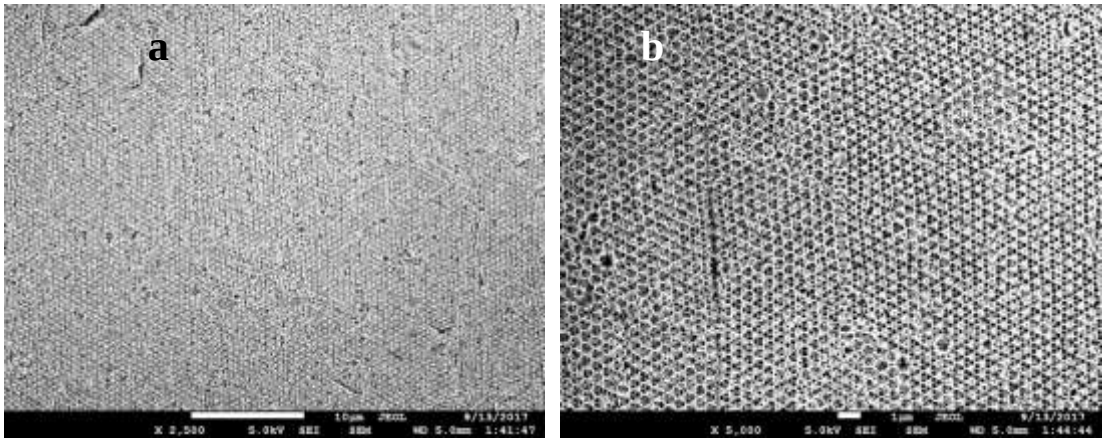

Figure S2. SEM images (90° Top View) of TiO_2-WO_3 IO samples taken at magnification of 2500 and 5000.

Calculation of Volume Ratio of WO_3 to TiO_2.

The atomic ratio of TiO_2 and WO_3 has been obtained through EDX measurement shown in Fig 3b. Currently, the volume ratio of these two components has been re-calculated based on the more accurate TEM-EDX data (as opposed to SEM-EDX previously) and the ratio is 3.58. The detailed calculation is shown below and has also been added into the Supplementary Information.

The weight% (Wt%) and atomic% (At%)of Ti and W in TiO_2-WO_3 inverse opal are obtained from TEM-EDX as shown below.

Element	*Wt%*	*At%*
TiK	11.09	32.37
WL	88.91	67.63
Matrix	Correction	MThin

For the hybrid composite, the only components considered are WO_3 and TiO_2. Thus,

$$\frac{At_W}{At_T} = \frac{At_{WO_3}}{At_{TiO_2}} = \frac{M_{WO_3}}{M_{TiO_2}}$$

$$\frac{V_{WO_3}}{V_{TiO_2}} = \frac{m_{WO_3}/\rho_{WO_3}}{m_{TiO_2}/\rho_{TiO_2}} = \left(\frac{m_{WO_3}}{m_{TiO_2}}\right)\cdot\left(\frac{\rho_{TiO_2}}{\rho_{WO_3}}\right)$$

$$= \frac{M_{WO_3}\cdot Molar\ mass\ of\ WO_3}{M_{TiO_2}\cdot Molar\ mass\ of\ TiO_2} \cdot \frac{\rho_{TiO_2}}{\rho_{WO_3}}$$

$$= \frac{(67.63)(231.84)}{(32.37)(79.87)} \cdot \frac{4.23}{7.16}$$

$$= \underline{3.58\ (3\ s.f.)}$$

where V, M, m, ρ refers to the volume, Molar %, molecular mass, density.

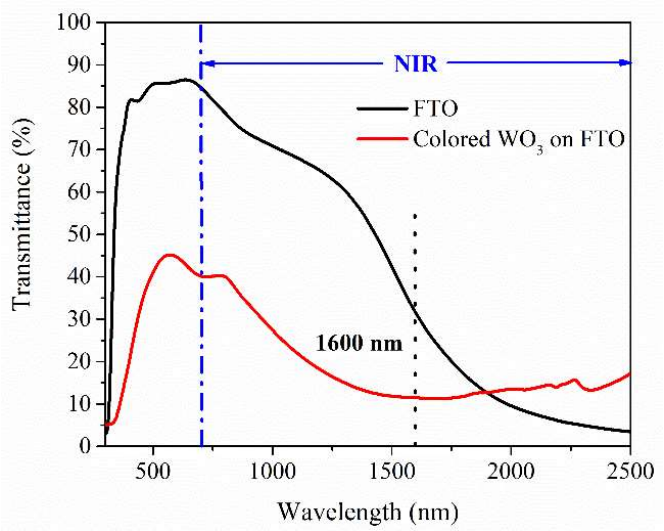

Figure S3. Vis-NIR Transmittance Spectrum of FTO and FTO|WO_3 samples refer to air.

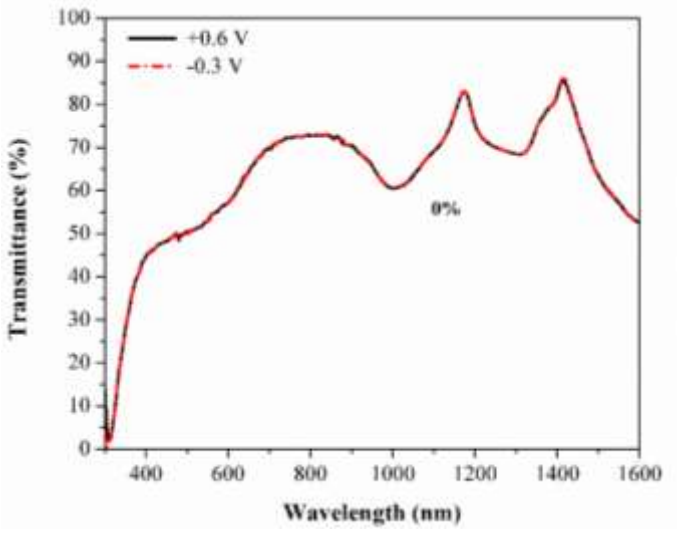

Figure S4. Transmittance Spectrum of TiO_2 IO samples at applied potentials.

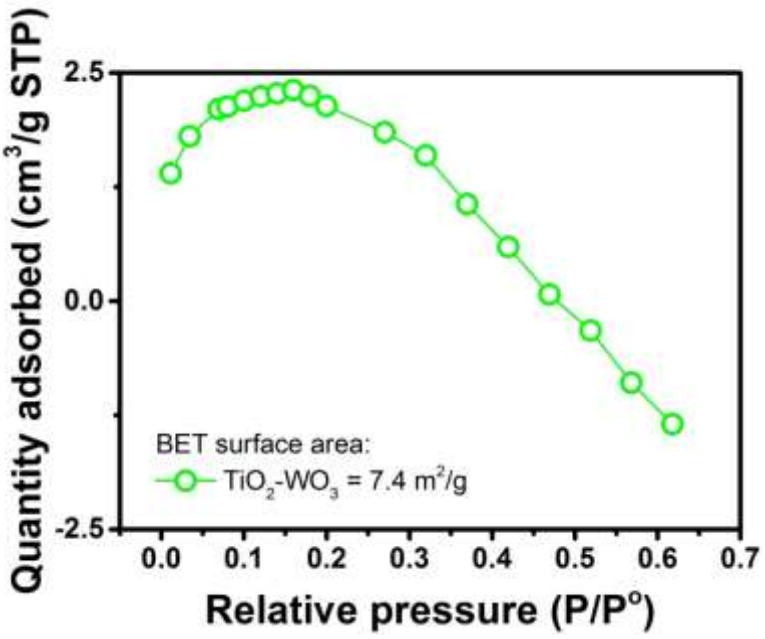

Figure S5. BET isotherm linear plot for TiO_2-WO_3 core-shell IO.

$$A_S = \frac{1}{\rho_{WO_3} * \lfloor}$$

$$= \frac{1}{\frac{7160000g}{m^3} * 464.118 * 10^{-9}\, m}$$

$$= \underline{0.300\ m^2/g\ (3\ s.f.)}$$

where A_s , ρ and ⌊ refers to the specific surface area, density and film thickness. ⌊ was measured using a stylus profiler (Alpha-Step D-500).