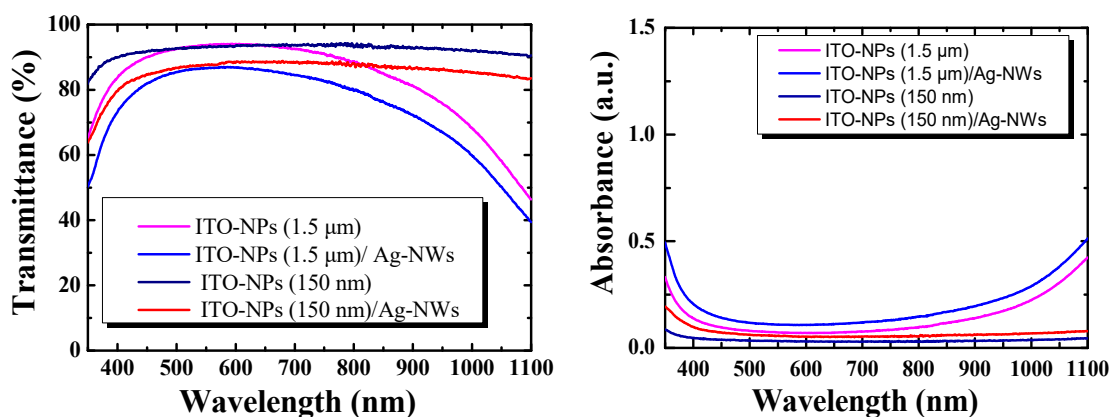


# Room Temperature Solution Processed 0D/1D Bilayer Electrodes for translucent CsPbBr<sub>3</sub> Perovskite Photovoltaics

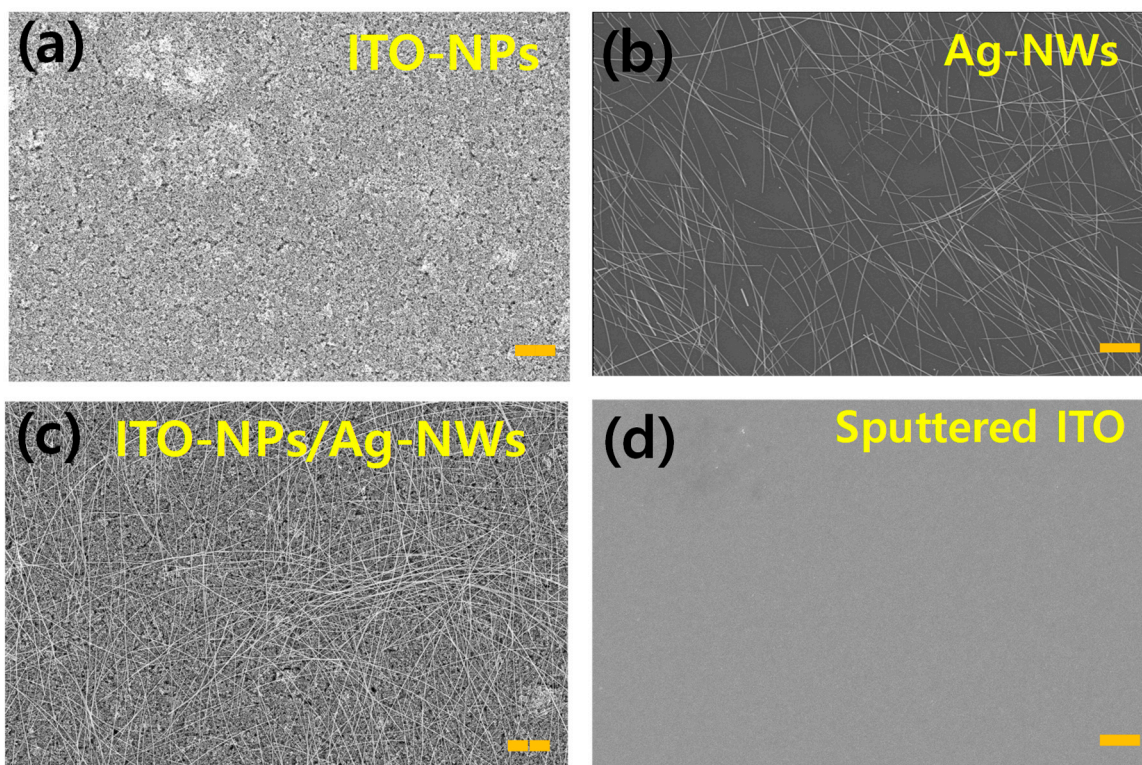
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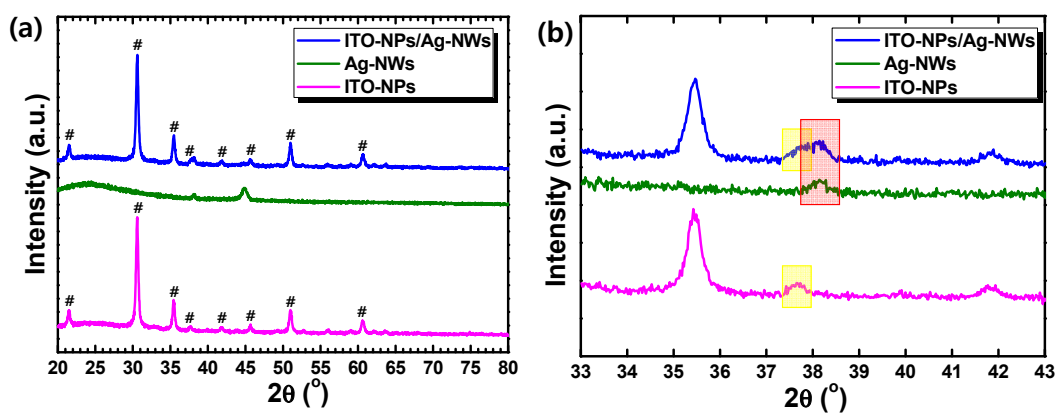
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**Figure S1.** The optical transmittance and absorption of the ITO-NPs, ITO-NPs/Ag-NWs samples with different thickness in ITO-NPs (150 nm and 1.5 μm)



**Figure S2.** Field enhanced scanning electron microscope (FE-SEM) top view images of ITO-NPs, Ag-NWs, ITO-NPs/Ag-NWs bilayer, and sputtered ITO films (2  $\mu\text{m}$  in scale bar).



**Figure S3.** (a) XRD patterns for comparison of ITO diffraction peaks (symbol : #) and (b) the enlarged comparison of ITO-NPs (yellow rectangle) and Ag-NWs (red rectangle) diffraction peaks with ITO-NPs, Ag-NWs and ITO-NPs/Ag-NWs films.

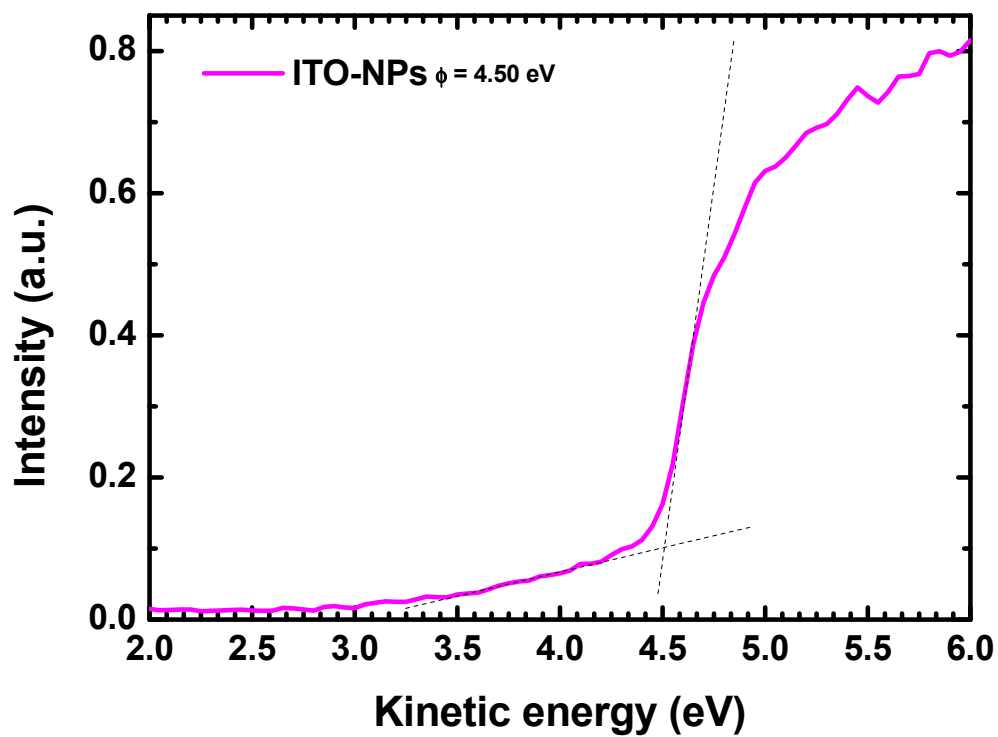


Figure S4. UPS spectra of ITO-NPs films.

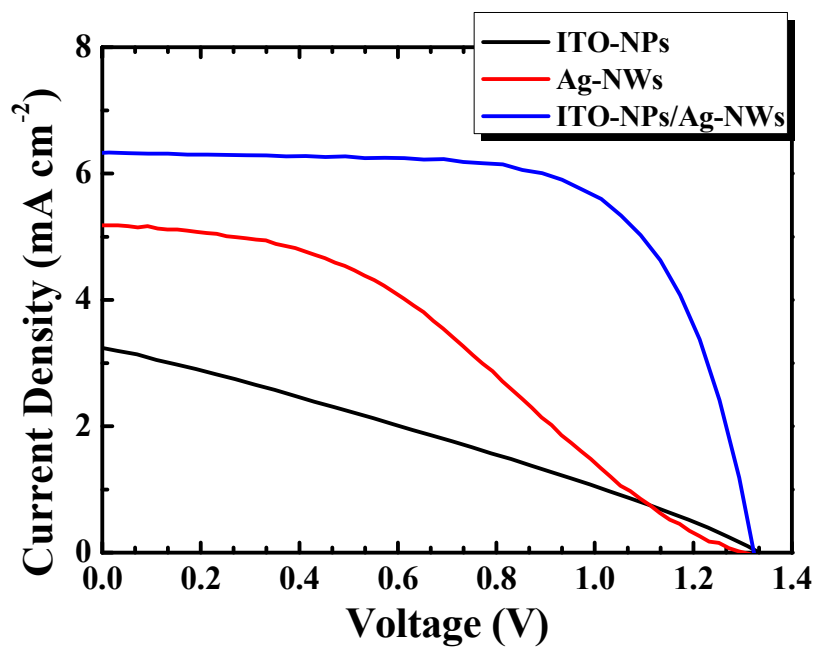


Figure S5. J-V properties of fabricated CsPbBr<sub>3</sub> perovskite solar cells with various solution-processed TEs.

**Table S1.** Device performance of fabricated CsPbBr<sub>3</sub> perovskite solar cells with various solution-processed TEs.

Electrodes	V <sub>oc</sub> (V)	J <sub>sc</sub> (mA cm <sup>-2</sup> )	FF	PCE (%)
ITO-NPs	1.33	3.20	0.299	1.27
Ag-NWs	1.29	5.18	0.370	2.48
ITO-NPs/Ag-NWs	1.32	6.33	0.677	5.64

**Table S2.** The detail PV parameters with statistical data for fabricated CsPbBr<sub>3</sub> solar cells with various rear electrode were included.

Electrodes	V <sub>oc</sub> (V)	J <sub>sc</sub> (mA cm <sup>-2</sup> )	FF	PCE (%)
Au (Opaque)	1.29 (±0.04)	6.84 (±0.35)	0.697 (±0.031)	6.16 (±0.43)
ITO (Vacuum)	0.82 (±0.22)	6.19 (±0.25)	0.421 (±0.100)	2.26 (±1.01)
ITO-NPs/Ag-NWs (Solution)	1.30 (±0.03)	6.19 (±0.27)	0.627 (±0.044)	5.06 (±0.39)