

# Supplementary Information

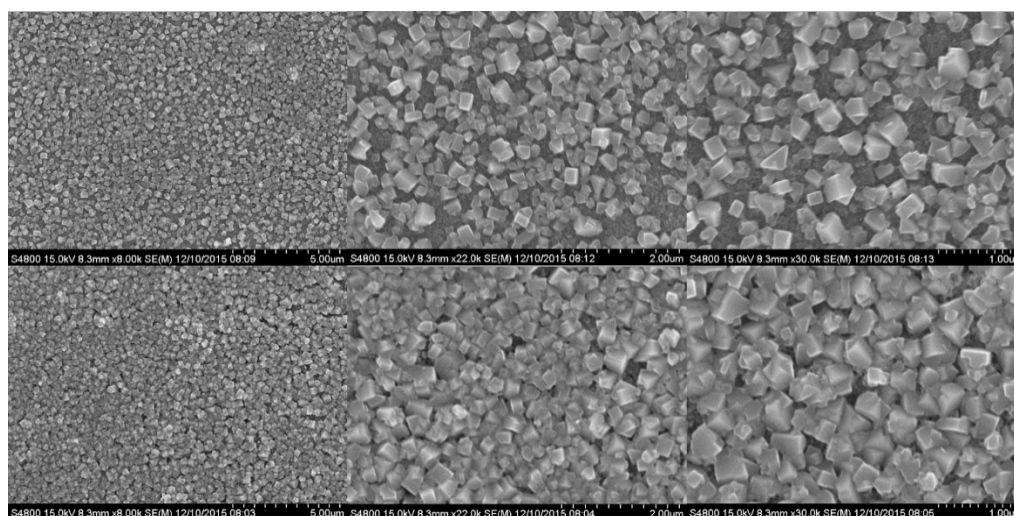
## A TiO<sub>2</sub> Nanotube Network Electron Transport Layer for High Efficiency Perovskite Solar Cells

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**Figure S1.** Comparison of perovskite deposition between nanoparticle (top) and nanotube based electrode (bottom).

**Table S1.** Hysteresis data of the perovskite solar cells based on TiO<sub>2</sub> nanotube network electrode and nanoparticle mesoporous electrode. Reverse scan direction: from 1.1 V to 0 V, forward scan direction: from 0 to 1.1 V.

	$V_{oc}$ (V)	$J_{sc}$ (mA/cm <sup>2</sup> )	$FF$	$\eta$ (%)
Nanoparticle reverse	0.84	21.7	0.60	10.9
Nanoparticle forward	0.82	19.4	0.5	7.9
Nanotube reverse	0.88	24.8	0.63	13.8
Nanotube forward	0.85	23.2	0.59	11.6

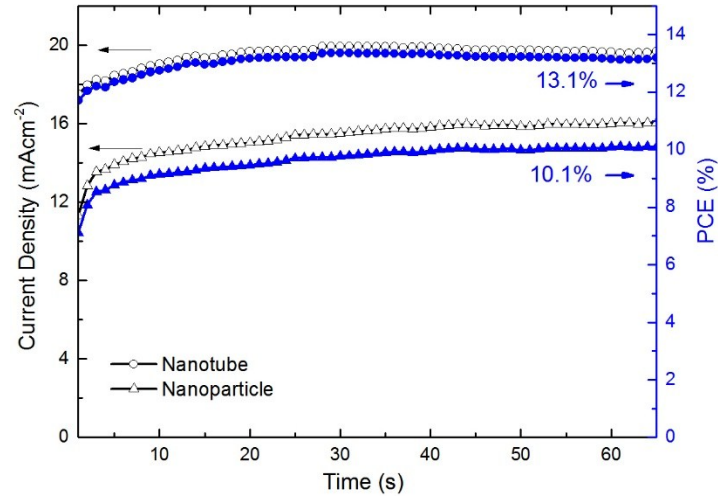


Figure S2 The photocurrent density as a function of time for the cells held at a forward bias of the maximum output power point (0.67 and 0.63 V for the devices based on nanotube and nanoparticle, respectively).