Electronic Supplementary Material (ESI) for Nanoscale

Electronic Supplementary data

TiO_2 anatase nanorod-decorating for highly efficient photoenergy conversion

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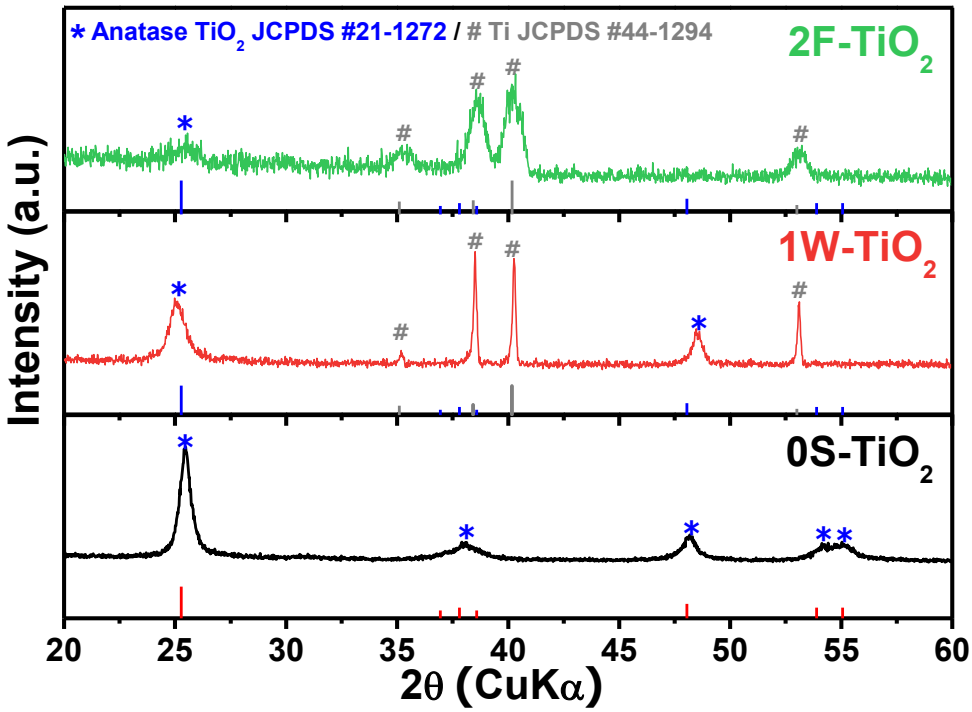


Fig. S1 XRD patterns of three types TiO_2 hosts; 0-D sphere TiO_2 (0S), 1-D wire TiO_2 (1W), and 2-D thin film TiO_2 (2F) hosts.

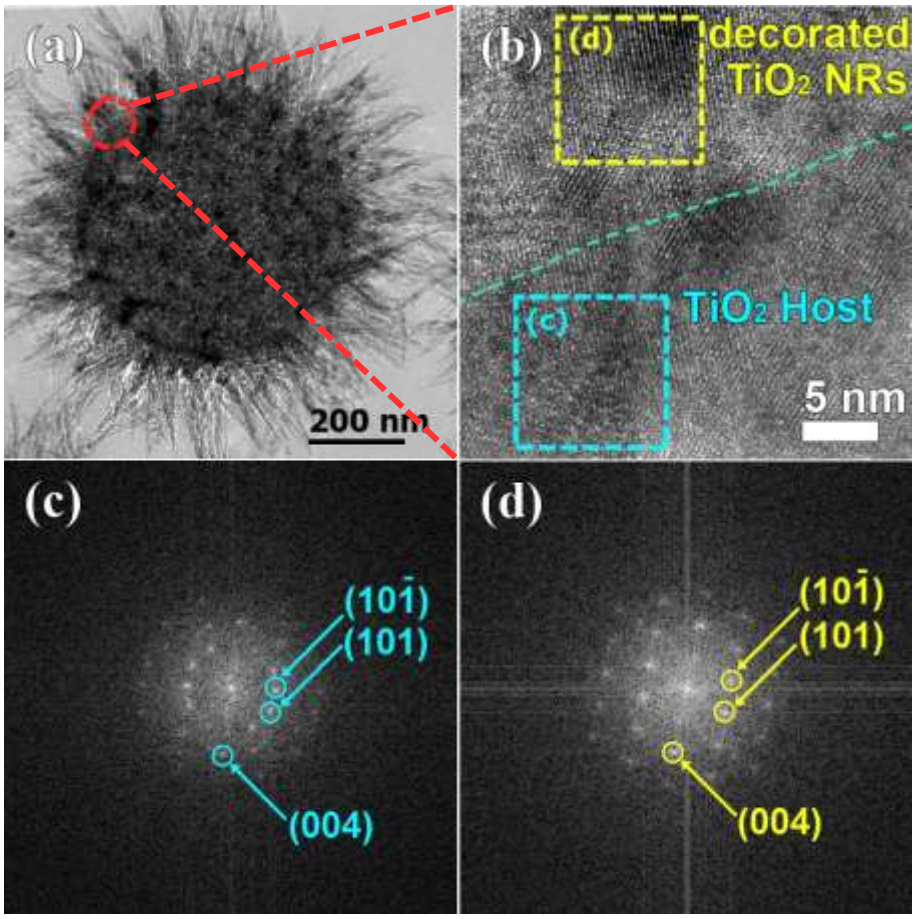


Fig. S2 (a) Cross-sectional TEM images of BS-TiO_2, (b) cross-sectional HRTEM images of interface between nanorod branch parts and TiO_2 hosts, and (c), (d) the FFT pattern transformed from the blue and yellow square in (b).

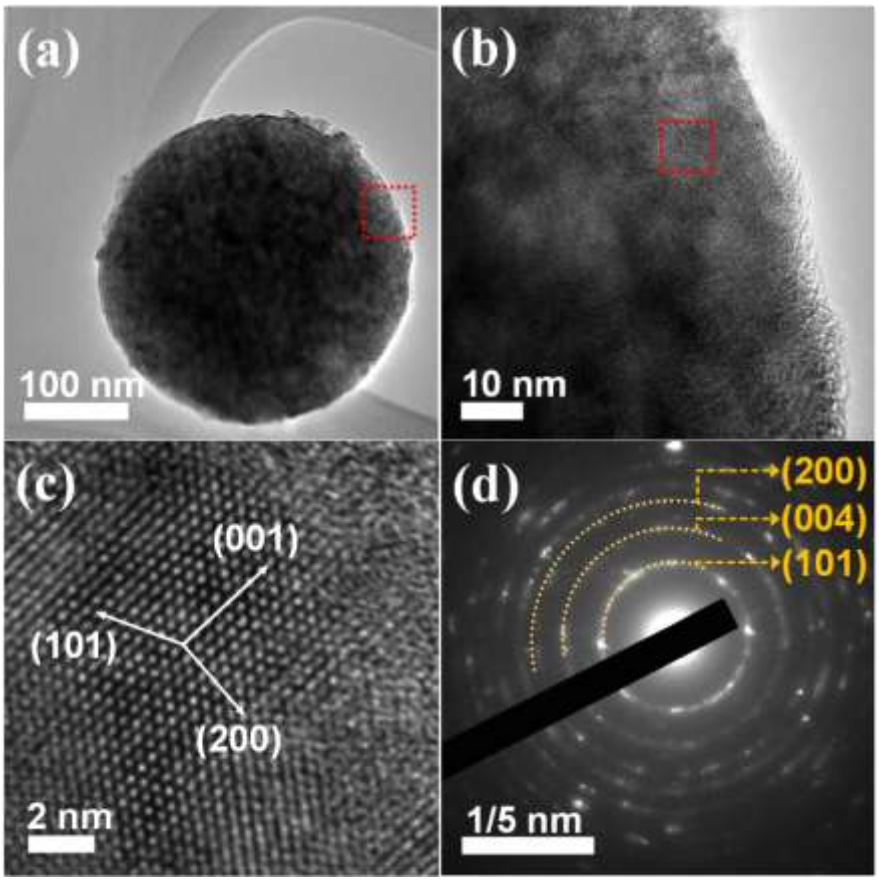


Fig. S3 (a) Typical TEM images of 0S-TiO_2, (b) TEM images of surface region of 0S-TiO_2 corresponding with red-dot square in Fig. S3 (a), (c) HRTEM images of nanograins of 0S-TiO_2 corresponding with red-dot square in Fig. S3 (b), and (d) the SAED patterns of one 0S-TiO_2 particle.

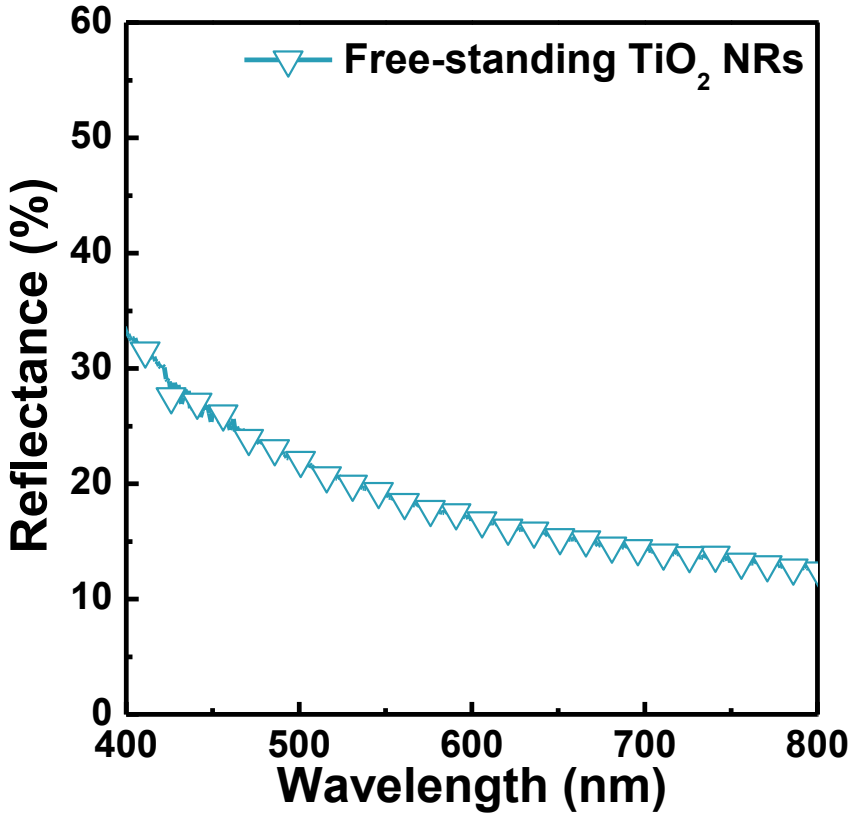


Fig. S4 Diffused reflectance spectrum of the free-standing TiO_2 nanorod.

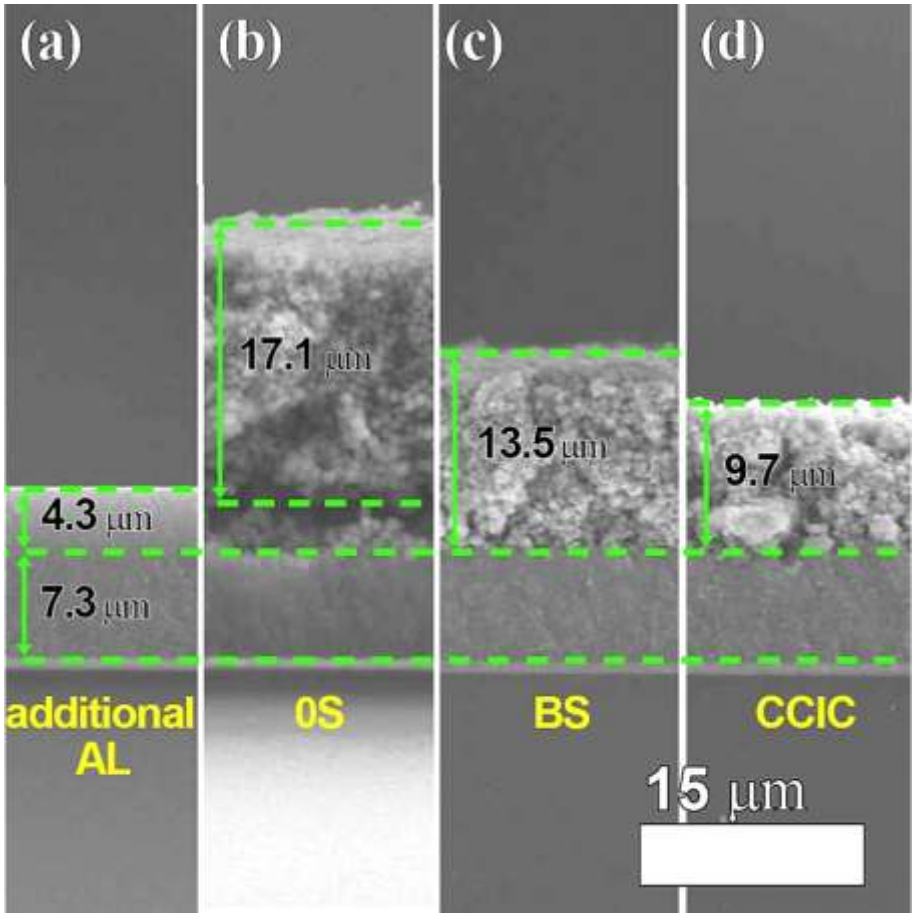
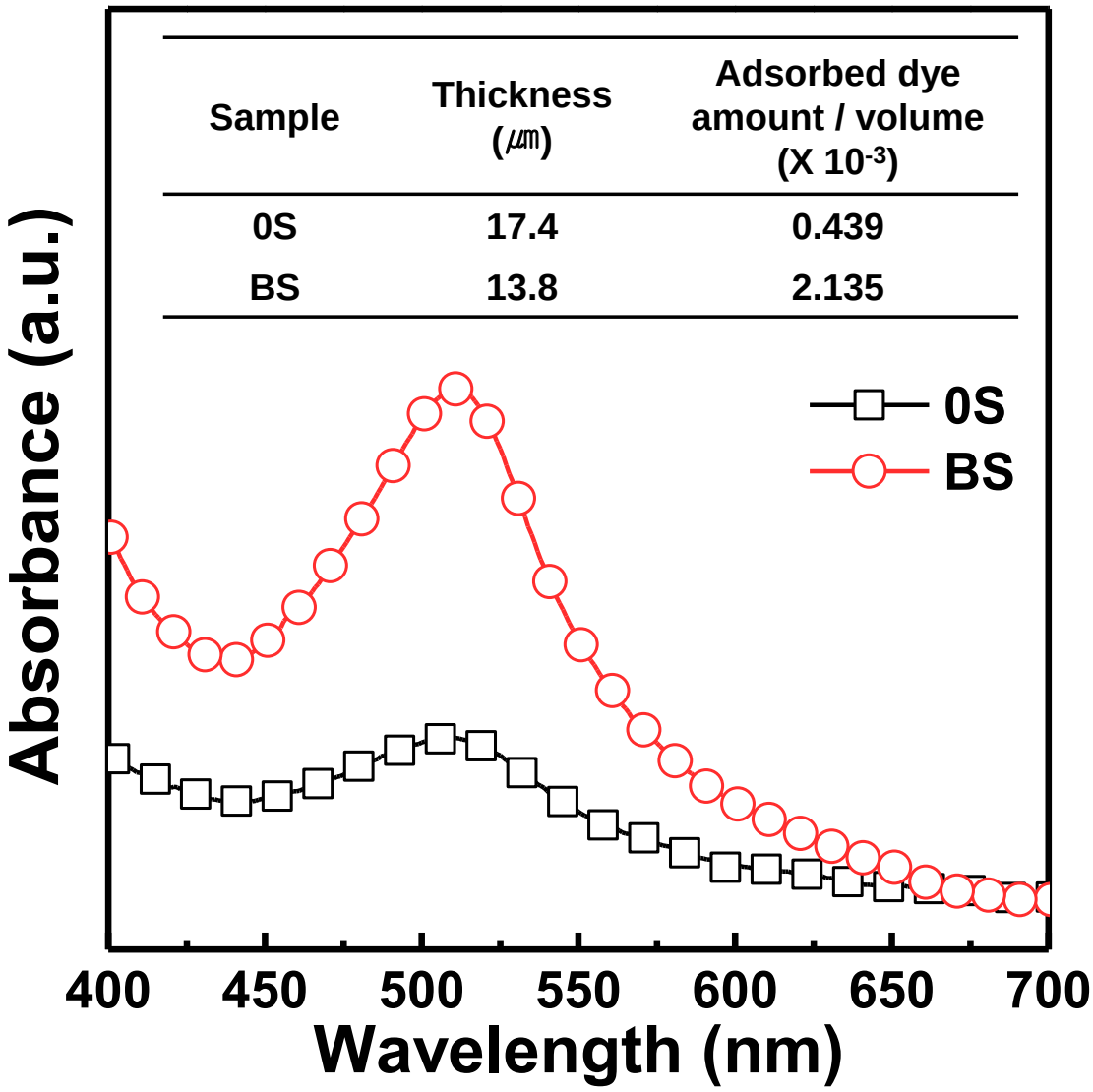


Fig. S5 Cross-sectional SEM images of photoelectrodes employing various scattering layers with t_{max}; (a) additional AL, (b) 0S, (c) BS, and (d) CCIC.



Sample	Thickness (㎛)	Adsorbed dye amount / volume (X 10^{-3})
0S	17.4	0.439
BS	13.8	2.135

Fig. S6 The UV-vis absorption spectra of desorbed dye solutions from 0S and BS monolayer films. The inset table shows the thickness of monolayer films and adsorbed dye amount per surface volume.

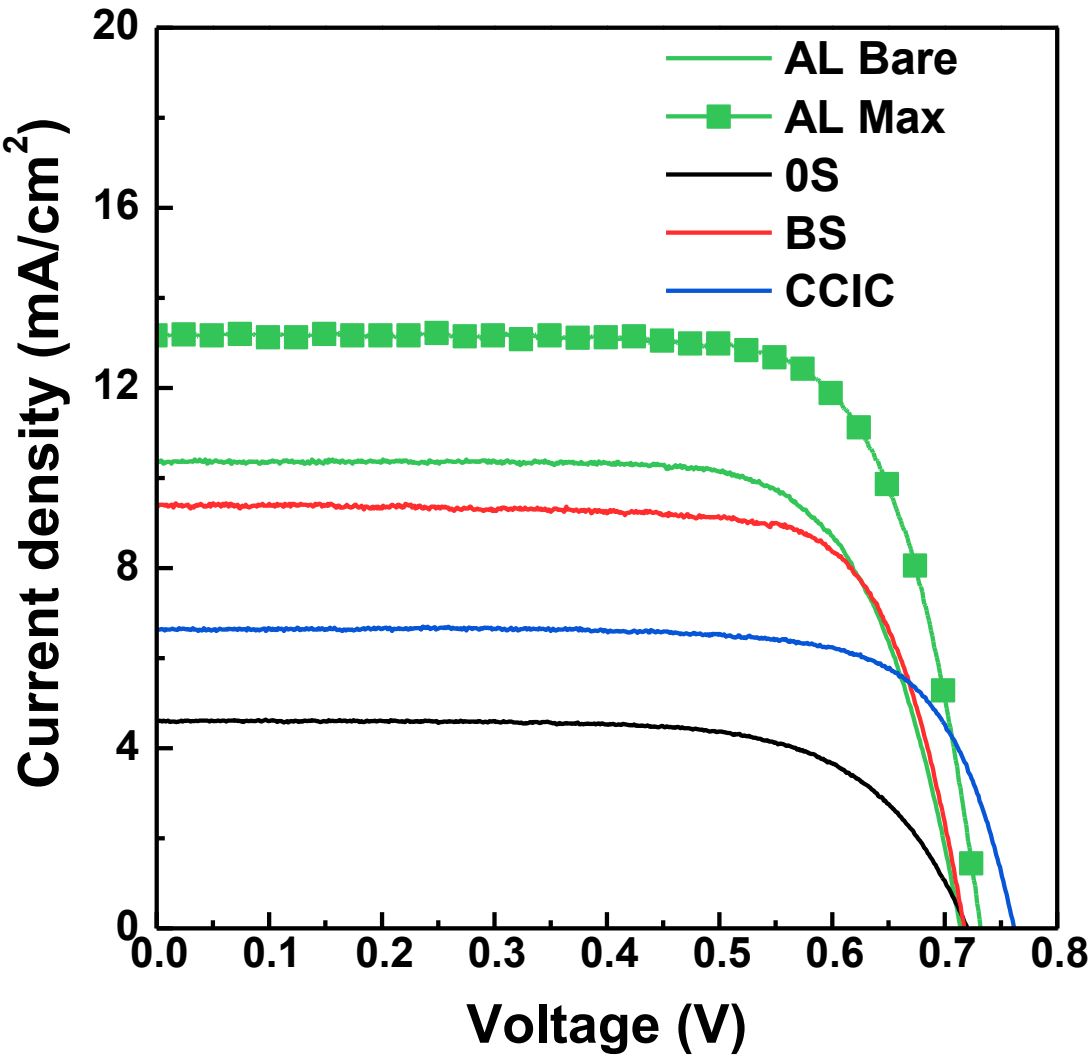


Fig. S7. *J-V* curves of the DSSCs employ each active layer with corresponding certain thickness (AL bare – 7.3 μm, AL Max – 11.6 μm, 0S - 17.4 μm, BS - 13.4 μm, and CCIC - 9.7 μm).

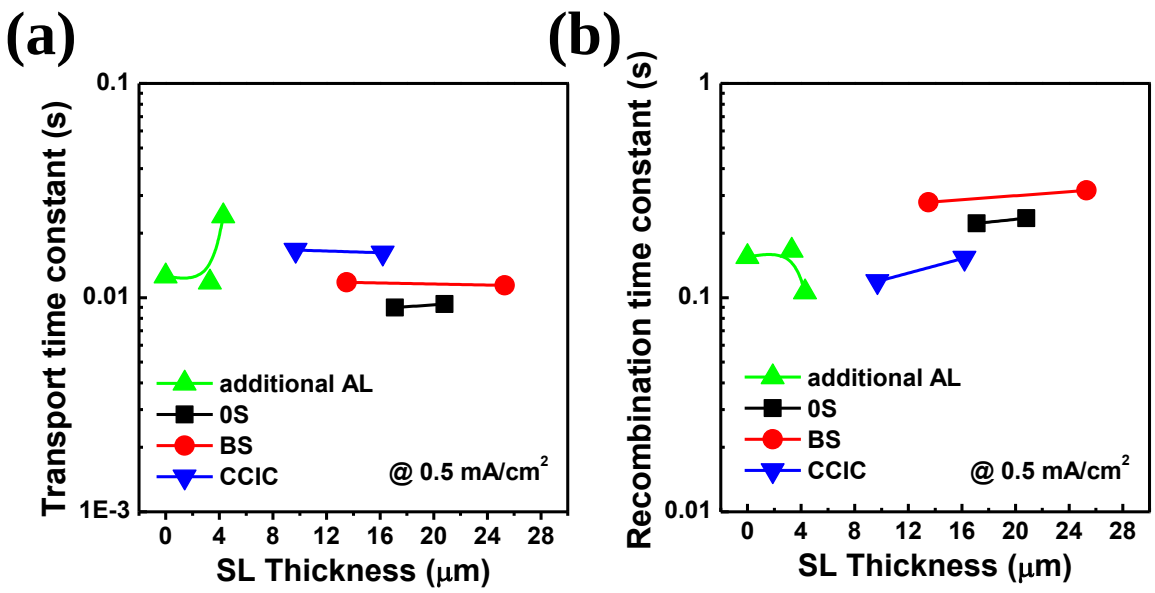


Fig. S8 (a) Transport time constants and (b) Recombination time constants versus scattering layer thickness of the DSSCs employing each type of scattering layer with various scattering layer thickness at constant photocurrent density (J_{sc} = 0.5 mA/cm^2).

Table S1. Photovoltaic parameters of the DSSCs employing each type of scattering layer with corresponding t_{max} that corresponding with Fig. 5b.

Sample	**Thickness (μm)**	**J_{sc} (mA/cm^2)**	**V_{oc} (mV)**	**FF**	**Efficiency (%)**
Additional AL	7.3/4.3	13.2	732	0.74	7.16
0S	7.3/17.1	14.5	732	0.72	7.67
BS	7.3/13.5	17.2	722	0.73	9.09
CCIC	7.3/9.7	15.6	731	0.72	8.26

Table S2. Photovoltaic parameters of the DSSCs employing each type of active layer with corresponding certain thickness that corresponding with Fig. S7

Sample	**Thickness** (μm)	J_{sc} (mA/cm^2)	V_{oc} (mV)	**FF**	**Efficiency** (%)
AL Bare	7.3	10.4	715	0.72	5.39
AL Max	11.6	13.2	733	0.74	7.16
0S	17.4	4.61	721	0.69	2.28
BS	13.4	9.39	718	0.75	5.09
CCIC	9.7	6.64	762	0.75	3.80