Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A

Electronic Supplementary Information

Size and shape fine-tuning of SnO_2 nanoparticles for highly efficient and stable dye-sensitized solar sells

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N_2 sorption measurements

N_2 adsorption-desorption isotherms recorded for scraped off *nano*SnO_2, *nano*SnO_2&*octa*SnO_2 and *octa*SnO_2 films after $TiCl_4$ post-treatment are given in Fig. S1.

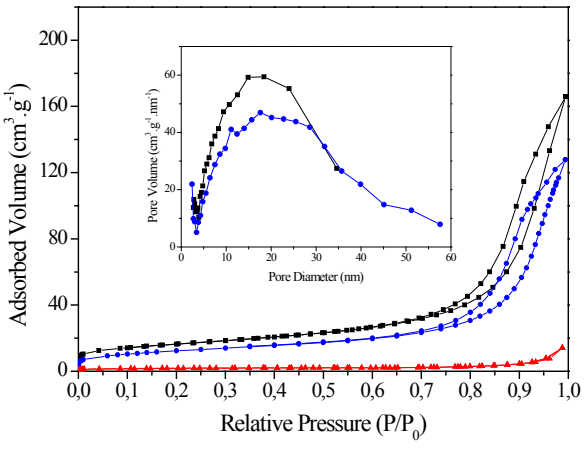

Fig. S1 N_2 adsorption-desorption isotherms for *nano*SnO_2 (square, black), *nano*SnO_2&*octa*SnO_2 (circle, blue) and *octa*SnO_2 (up-triangle, red) films after $TiCl_4$ post-treatment.

X-ray Photoelectron Spectroscopy

XPS spectra of *nano*SnO_2 and *nano*SnO_2_*octa*SnO_2 photoanodes are given in Fig. S2, S3 and S4.

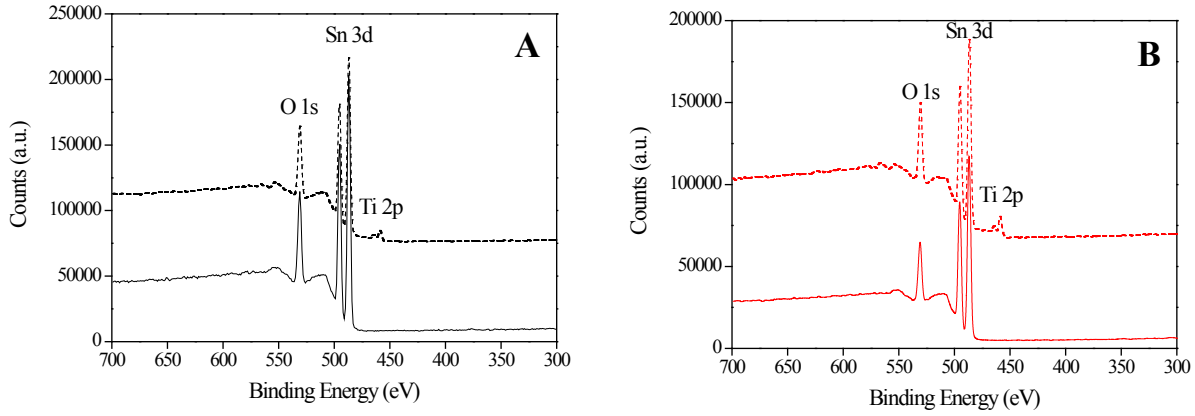

Fig. S2 XPS survey spectra of *nano*SnO_2 (**A**) and *nano*SnO_2_*octa*SnO_2 (**B**) photoanodes with (full line) and without $TiCl_4$ (dashed line) post-treatment.

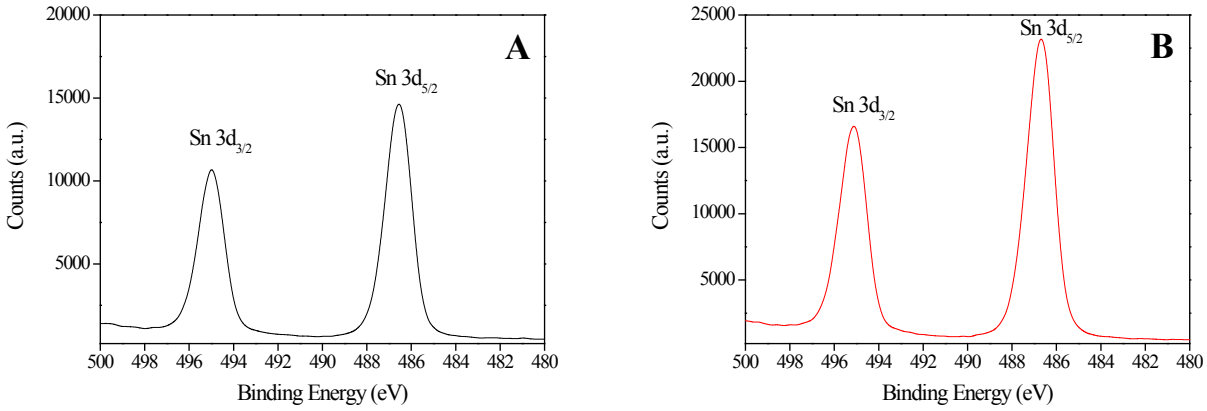

Fig. S3 XPS Sn3d region of *nano*SnO_2 (**A**) and *nano*SnO_2_*octa*SnO_2 (**B**) photoanodes without post-treatment.

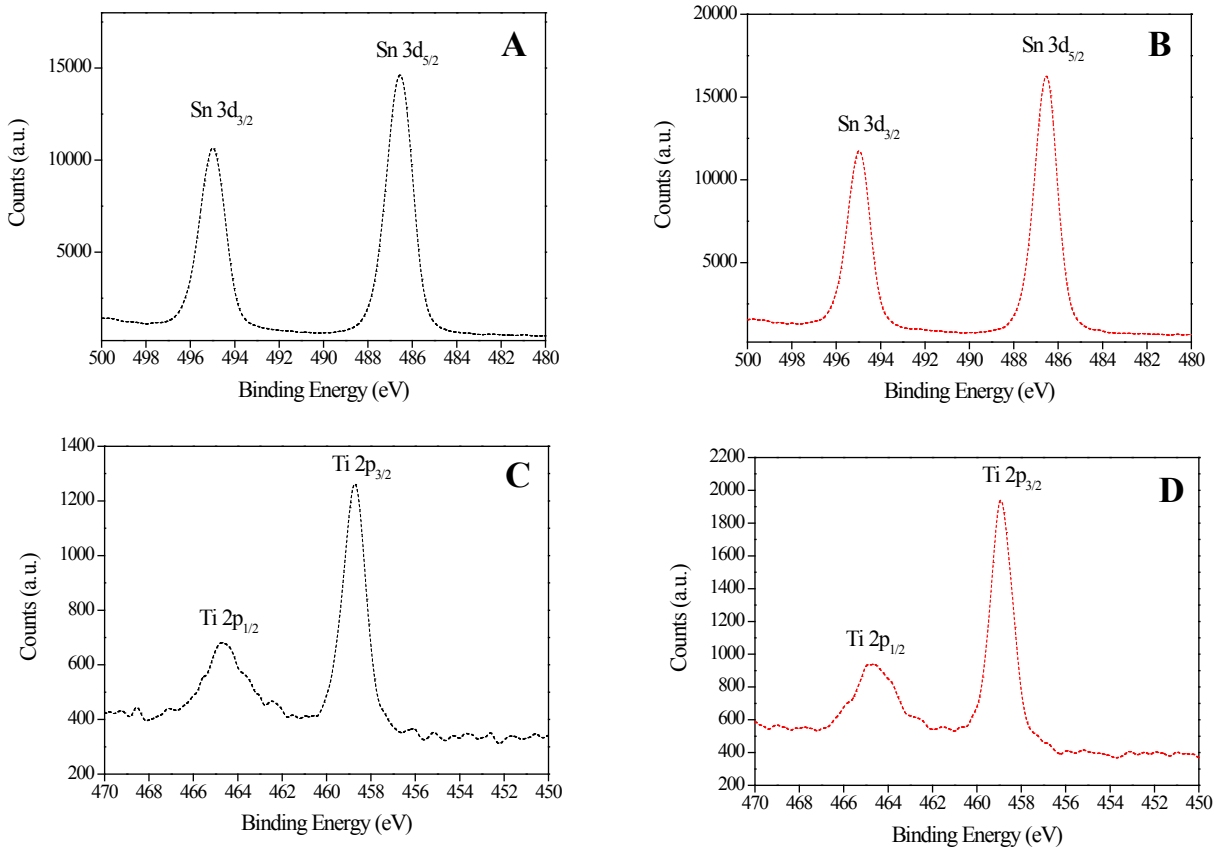

Fig. S4 XPS Sn3d and Ti2p regions of *nano*SnO_2 (**A**, **C**) and *nano*SnO_2_*octa*SnO_2 (**B**, **D**) photoanodes after $TiCl_4$ post-treatment.

ATR-FTIR spectroscopy

The ATR-FTIR spectra of N719-sensitized nanoSnO_2 and octaSnO_2 layers with or without $TiCl_4$-treatment are given in Fig. S5.

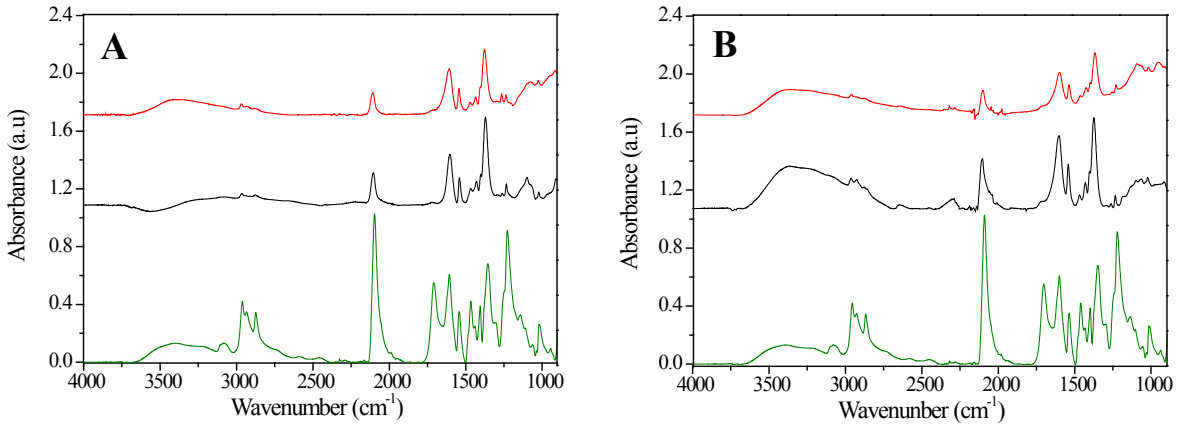

Fig. S5 ATR-FTIR spectra of N719 dye (powder, green), N719-sensitized nanoSnO_2 (black) and octaSnO_2 (red) layers with (**B**) or without (**A**) $TiCl_4$ post-treatment.

UV-visible diffuse reflectance spectroscopy

The UV-visible diffuse reflectance spectra of *nano*SnO_2, *nano*SnO_2&*octa*SnO_2 and *nano*SnO_2_*octa*SnO_2 films were recorded on a Varian Cary 5000 spectrophotometer. They are shown in Fig. S6.

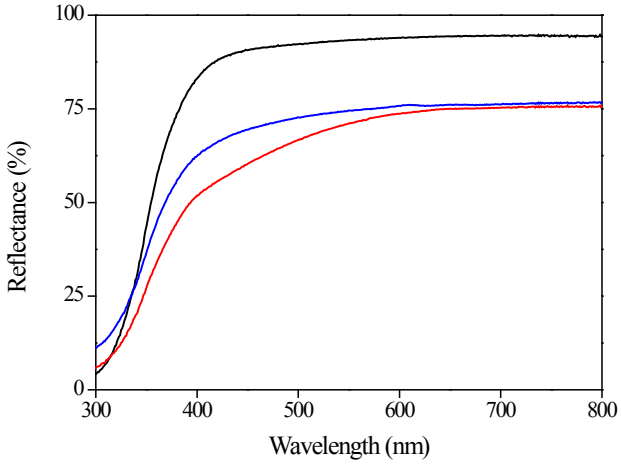

Fig. S6 UV-visible diffuse reflectance spectra of *nano*SnO_2 (black), *nano*SnO_2&*octa*SnO_2 (blue) and *nano*SnO_2_*octa*SnO_2 (red) films without $TiCl_4$ post-treatment.

Characterization of SnO_2-based DSCs

The photovoltaic parameters of the SnO_2-based DSCs measured just after assembling (within 2 hours) are reported in Table S1.

Table S1. Photovoltaic properties of DSCs assembled with different SnO_2 photoanodes just after assembling. Incident power: AM1.5G 100 $mW.cm^{-2}$.

Photoanode	$TiCl_4$	Th[a] (μm)	J_{sc} ($mA.cm^{-2}$)	V_{oc} (mV)	FF (%)	η (%)[c]
nanoSnO_2	none	13	10.3	440	41	1.9
	with	13	12.9	510	47	3.1
nanoSnO_2_ *octa*SnO_2	none	22	9.4	390	53	1.9
	with	22	13.9	460	49	3.2
nanoSnO_2& *octa*SnO_2	none	11	9.4	430	39	1.6
	with	11	9.5	510	50	2.4
octaSnO_2	none	8	2.1	600	42	0.5
	with	8	2.8	700	34	0.7

[a] Th: Film thickness determined from cross-sectional SEM micrographs; uncertainty ± 1μm. [b] A: Amount of dye chemisorbed; uncertainty ± 5%. [c] measured for at least three different cells; uncertainty ± 0.05 %.