Electronic Supplementary Material (ESI) for Nanoscale

Supporting Information

Double layered TiO_2 photoanode consisting of hierarchical flowers and nanoparticles for high-efficiency dye-sensitized solar cells

*Wu-Qiang Wu, Yang-Fan Xu, Hua-Shang Rao, Cheng-Yong Su and Dai-Bin Kuang**

MOE Key Laboratory of Bioinorganic and Synthetic Chemistry, KLGHEI of Environment and Energy Chemistry, State Key Laboratory of Optoelectronic Materials and Technologies, School of Chemistry and Chemical Engineering, Sun Yat-sen University, Guangzhou 510275, P. R. China.

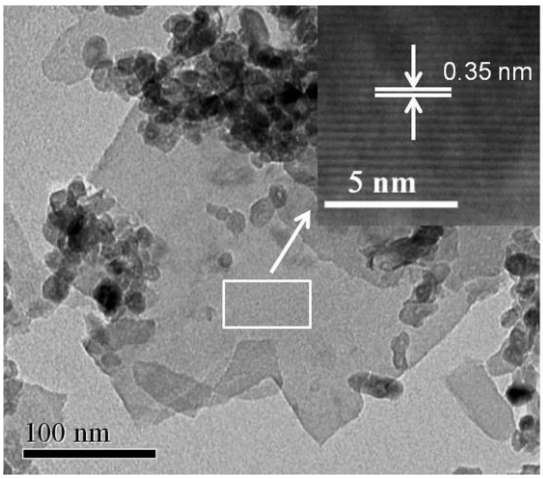

Fig. S1 TEM and HRTEM (inset figure) images of samples scraped from the as-prepared DL-TNPs+HTFs/FTO photoanodes.

Table S1. Detailed simulative value of resistance (R_1, R_2) and electron lifetime value (τ_r) from EIS spectra calculated by equivalent circuit as shown in Fig. 5.

DSSCs	R_1 (ohm)	R_2 (ohm)	τ_r (s)
TNPs	6.17	109.9	0.099
DL-TNPs+THFs	6.05	162.1	0.138

Table S2. Summarized *J-V* parameters of DSSCs based on double layered TNPs+HTFs photoanodes with different thicknesses of TNPs measured under AM 1.5G illumination (100 mW cm^{-2}).

Cell	J_{sc} (mA cm^{-2})	V_{oc} (mV)	η (%)	*FF*
2 μm TNPs + 5 μm HTFs	8.41	813	4.89	0.71
5 μm TNPs + 5 μm HTFs	13.49	806	7.44	0.68
10 μm TNPs+5 μm HTFs	16.76	783	8.66	0.66
15 μm TNPs+5 μm HTFs	17.85	763	9.08	0.67
20 μm TNPs+5 μm HTFs	17.47	742	8.43	0.67
[a]15 μm TNPs+5 μm ETSs	17.17	776	8.79	0.66

[a] ETSs are ellipsoid TiO_2 spheres (350-400 nm in length). The 15 μm TNPs+5 μm ETSs double layered photoelectrode is obtained by screen printing ETSs scattering layer (5 μm) on the TNPs layer (15 μm).