Electronic Supplementary Material (ESI) for CrystEngComm

Electronic Supporting Information:

One-dimensionTiO_2 Nanostructures: Oriented Attachment and Application in Dye-sensitized Solar Cell

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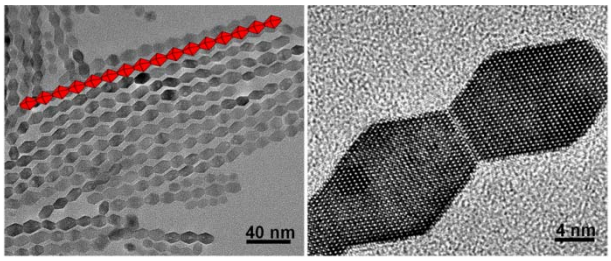

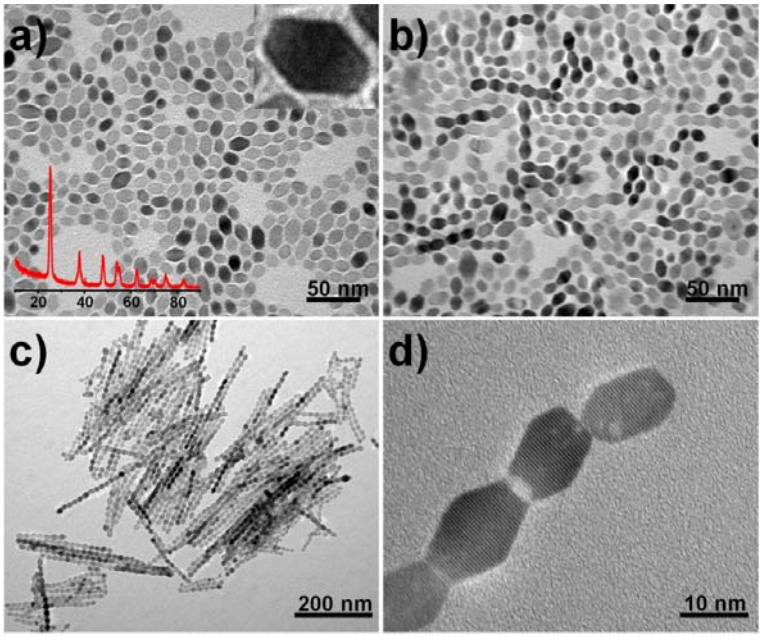

Figure S1. TEM images illustrating the shape evolution process of nanochains in the second step of synthesis. a) Anatase primary nanoparticles obtained at the end of first step; b) after 3 hours synthesis in the second step; c) after 8 hours synthesis at the second step. d) HRTEM image shows that the crystal planes were not entirely fused.

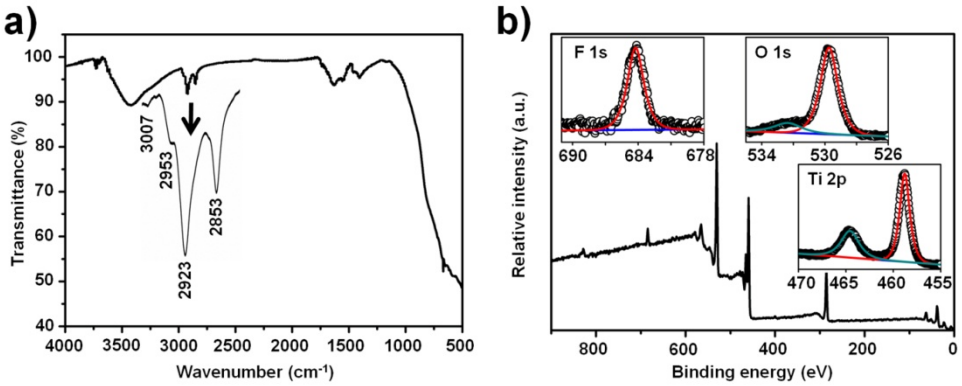

Figure S2. Characterization of the surface adsorbed species of primary nanoparticles: a) FTIR spectrum; b) XPS spectrum.

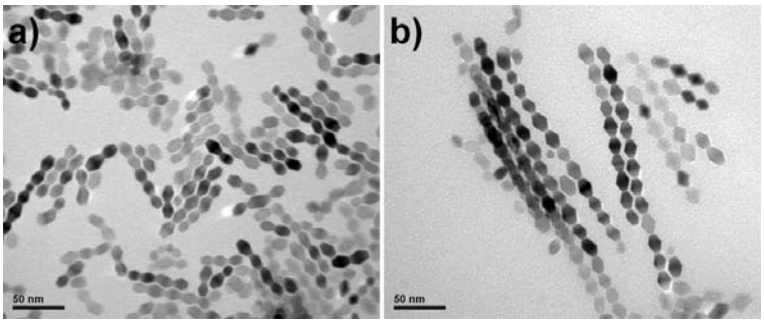

Figure S3. TEM images of the sample prepared by the addition of other hydroxyl group donors: a) ethanol, CH_3CH_2OH; b) n-propanol, CH_3H_7OH.

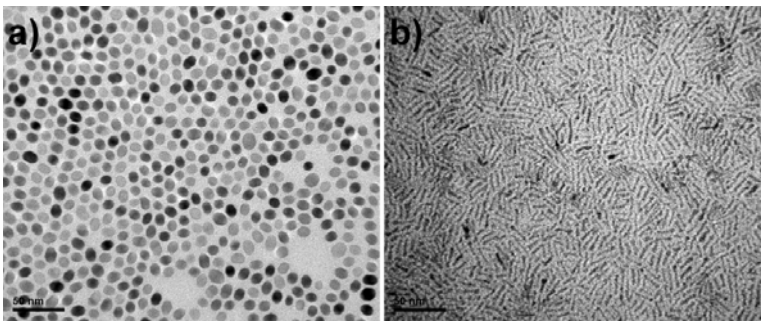

Figure S4. TEM images: a) Qusi-spherical nanoparticles and b) nanorods. These nanocrystal were used as primary nanoparticles for investigating the influence of morphologies on oriented attachment.

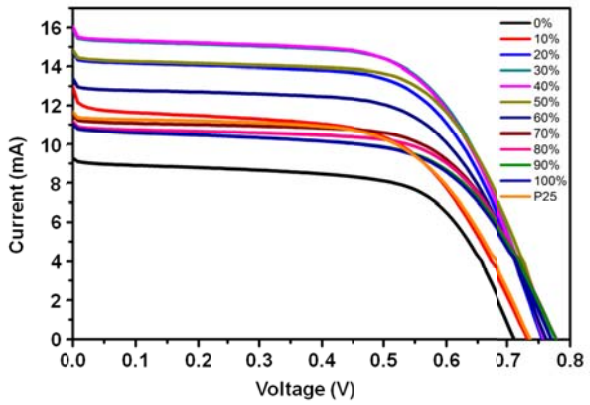

Figure S5. Current density-Voltage characteristics of the fabricated DSSCs under AM 1.5 conditions.

Nanochains (wt %)	Jsc ($mAcm^{-2}$)	Voc (V)	FF	η (%)
0%	9.273456	0.711318	60.71075	4.2026
10%	12.953788	0.732476	60.218556	5.2393
20%	14.79588	0.755857	61.96475	6.9299
30%	15.95188	0.758125	61.725054	7.4647
40%	16.037988	0.759018	60.908757	7.4145
50%	14.841776	0.769727	62.830822	7.1779
60%	13.406848	0.762083	61.265374	6.2596
70%	11.500724	0.770313	63.359008	5.6131
80%	11.176992	0.778257	62.920617	5.4232
90%	11.019052	0.777437	61.320767	5.2531
100%	11.023632	0.770466	61.337296	5.2096
P25	11.672640	0.736808	60.452539	5.1992

Table S1. Efficiency parameters measured for the DSSCs with different mass percentages of nanochains in photoanode.

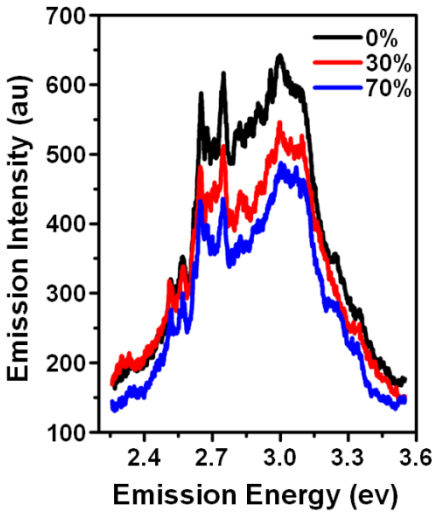

Figure S6. PL emission spectra (λ_{ex}=310 nm, 4.0eV) of TiO_2 films with a series of nanochain content. Emissions with maxima in the range of 3.0-3.2eV have been attributed to the band-edge transitions of the anatase crystallite. The emissions in range of 2.5-2.8eV are generally associated with surface defect sites.

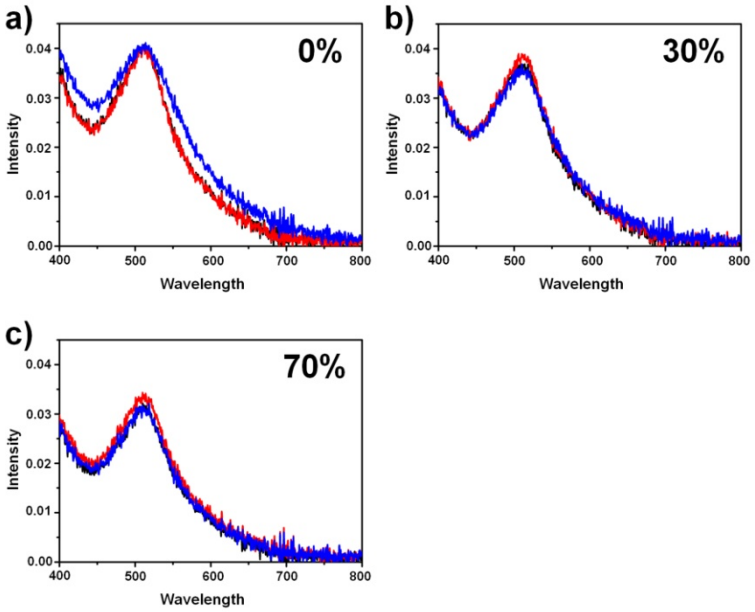

Figure S7. Absorption spectra of N719 in NaOH solutions for TiO_2 films with a series of nanochain contents: a) 0%; b) 30%; c) 70%. For each content three films were prepared and tested. The dye adsorption amount was calculated to be $11.42*10^{-8}$mol/cm^2; $10.61*10^{-8}$mol/cm^2; $9.21*10^{-8}$mol/cm^2 respectively.