Electronic Supplementary Material (ESI) for CrystEngComm

Supporting Information

Morphology control of rutile TiO_2 3D hierarchical architectures and their excellent field emission properties

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Supporting Information (SI-1): Debye-Scherrer formula for calculation of estimated crystallite sizes of TiO_2 hierarchical architectures.

The average crystal size can be estimated by the Scherrer's formula,given by

$$D = \frac{(K\lambda)}{\beta \cos\theta}$$

where D is the crystallite sizes, λ is the wave length of the X-ray radiation (0.15406 nm), K is a is the shape coefficient (value between 0.9 and1.0), θ is the diffraction angle, and β (β is the full width at half maximum (FWHM) of the selected diffraction peak.

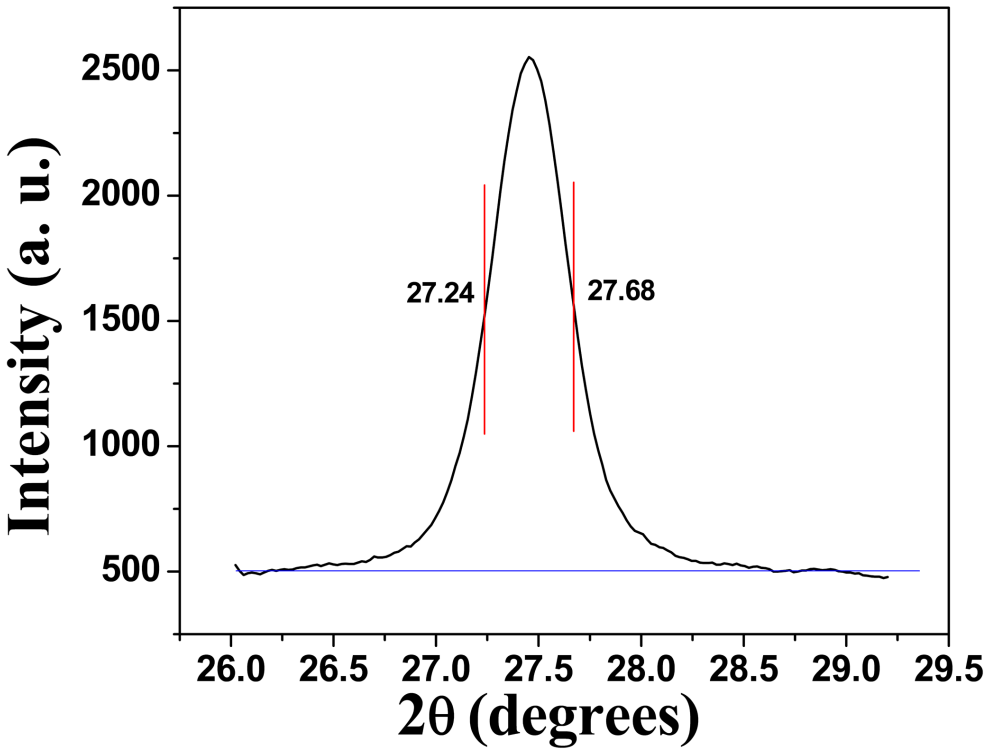


Fig. SI-2. Crystallite sizes for 3DT-2 are calculated using maximum intensity (110) peak.

Supporting Information (SI-2): Cross section images of a hierarchical microsphere.

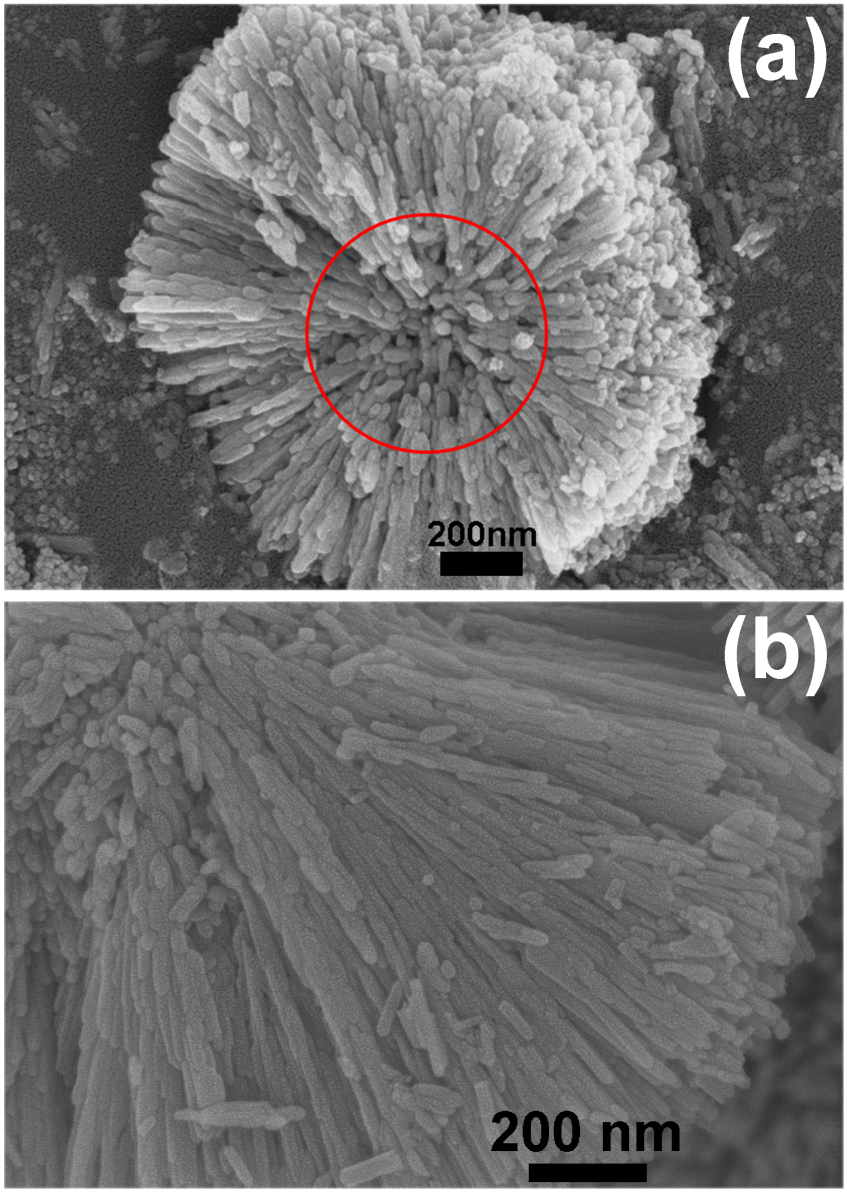


Fig. SI-2. Cross section images of a hierarchical sphere obtained by 2ml of hydrochloric acid. The obtained architecture has a solid core (highlighted by red ringin Figure SI-2a). Each long nanorods consists of short nanorods (Figure SI-2b).

Supporting Information (SI-3): Cross section images of a hierarchical architecture.

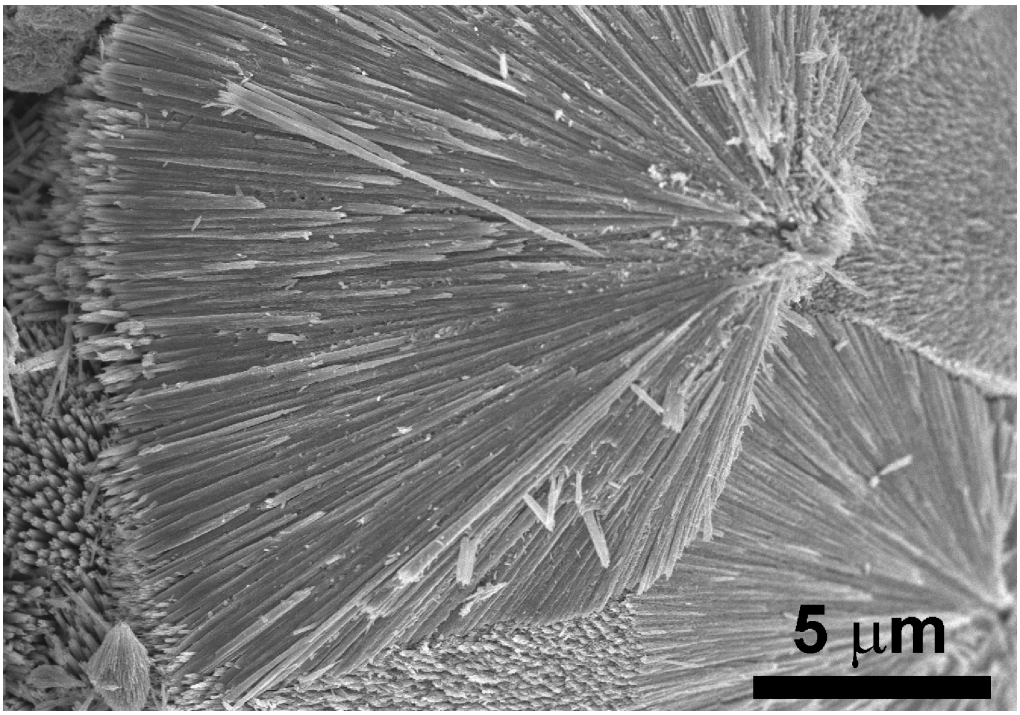


Fig. SI-3. Cross section images of a hierarchical architecture obtained by 3.5ml of hydrochloric acid.

Supporting Information (SI-4): FESEM images for the sample 3DT-3.5.

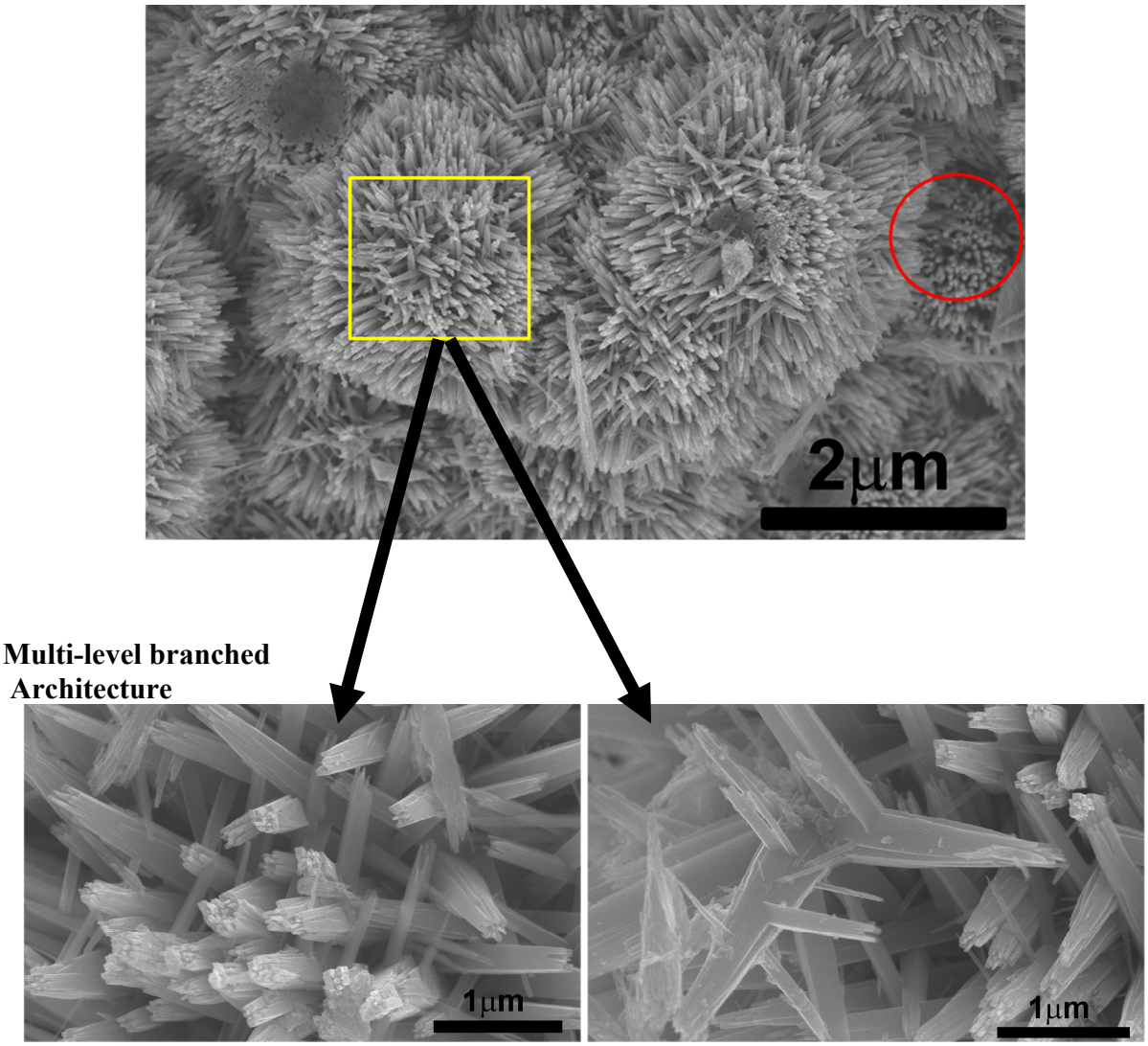


Fig. SI-4. Yellow square shows multi-level branched and high magnification SEM image also shown by black arrow.

Supporting Information (SI-5): FESEM images for the sample 3DT-4.

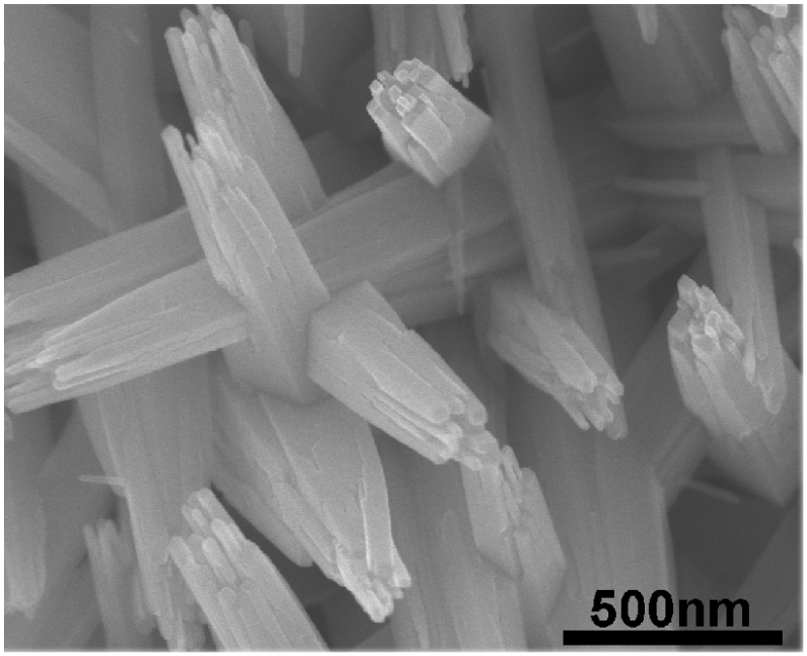
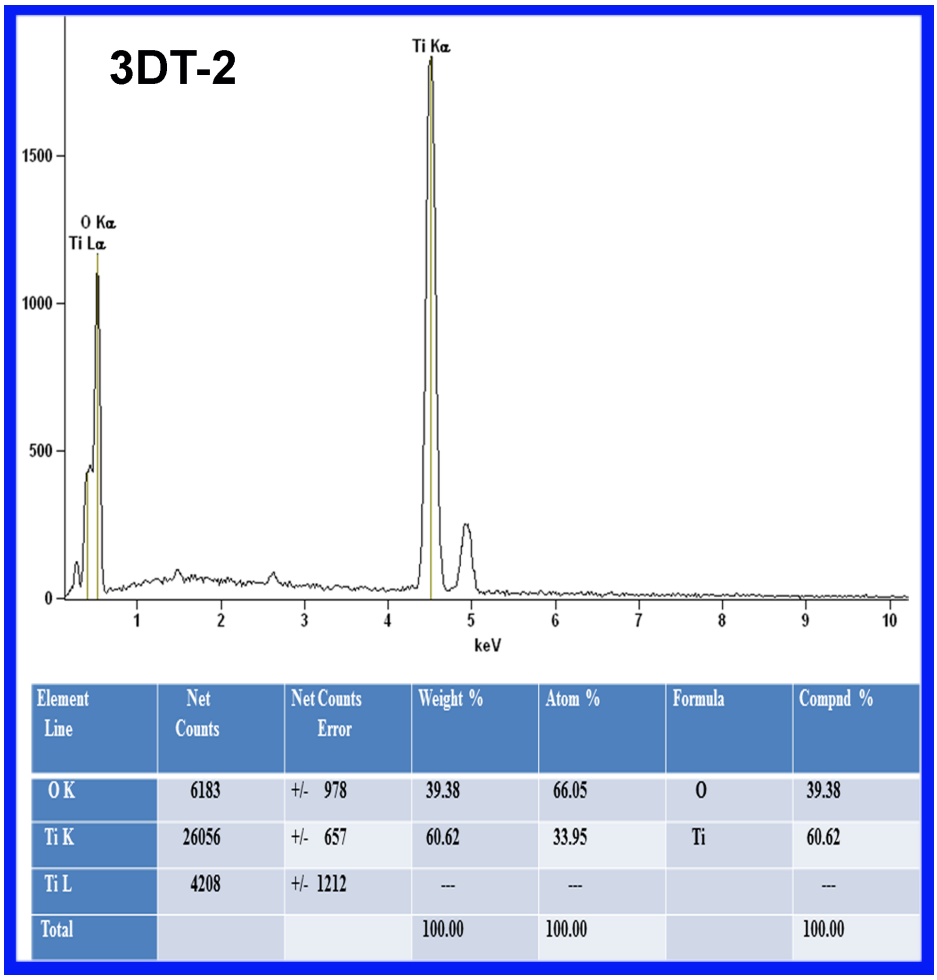
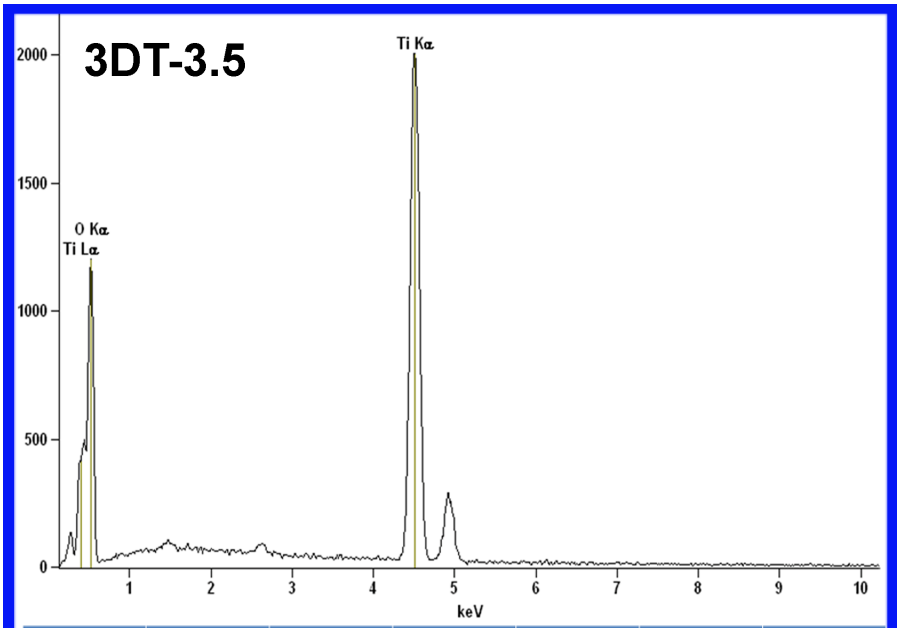


Fig. SI-5. Branches are oriented randomly and they make an angle about 75° with trunks.

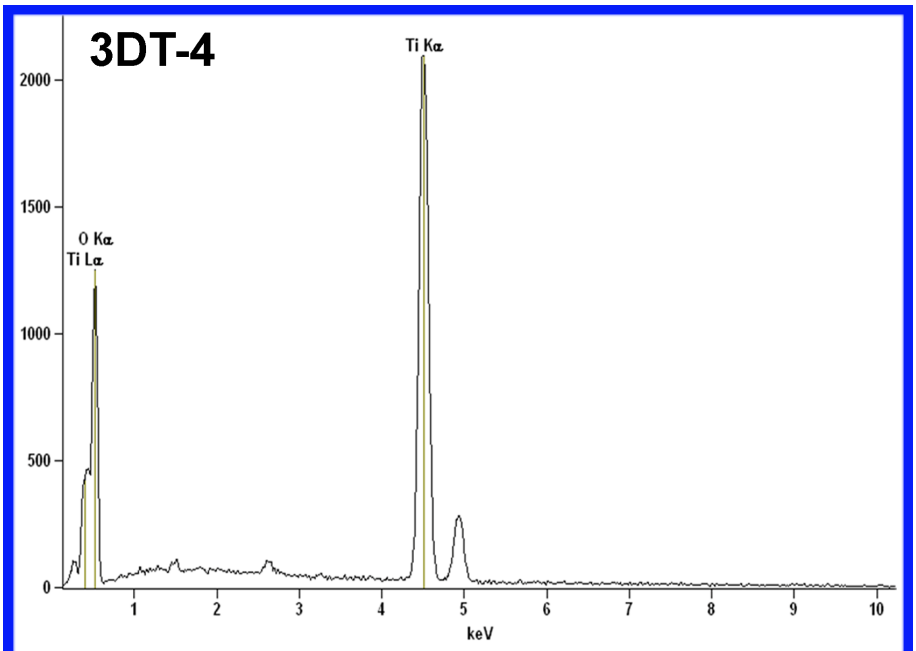
Supporting Information (SI-6): The energy dispersive analysis of X-ray (EDS) pattern of hierarchical TiO_2 architecture.



Element Line	Net Counts	Net Counts Error	Weight %	Atom %	Formula	Compnd %
O K	6183	+/- 978	39.38	66.05	O	39.38
Ti K	26056	+/- 657	60.62	33.95	Ti	60.62
Ti L	4208	+/- 1212	---	---		---
Total			100.00	100.00		100.00



Element Line	Net Counts	Net Counts Error	Weight %	Atom %	Formula	Compnd %
O K	6698	+/- 1011	39.51	66.16	O	39.51
Ti K	28117	+/- 681	60.49	33.84	Ti	60.49
Ti L	4654	+/- 1254	---	---		---
Total			100.00	100.00		100.00



Element Line	Net Counts	Net Counts Error	Weight %	Atom %	Formula	Compnd %
O K	6725	+/- 1014	38.76	65.46	O	38.76
Ti K	29388	+/- 699	61.24	34.54	Ti	61.24
Ti L	4763	+/- 1254	---	---		---
Total			100.00	100.00		100.00

Fig. SI-6. EDS pattern and corresponding tables of TiO_2 architecture shows the atomic ratio of Ti to O was found close to1:2.