Electronic Supplementary Material (ESI) for Nanoscale

Supporting Information

Hierarchical Assembly of Ti(IV)/Sn(II) co-doped SnO_2 Nanosheets along Sacrificial Titanate Nanowires: Synthesis, Characterization and Electrochemical Properties

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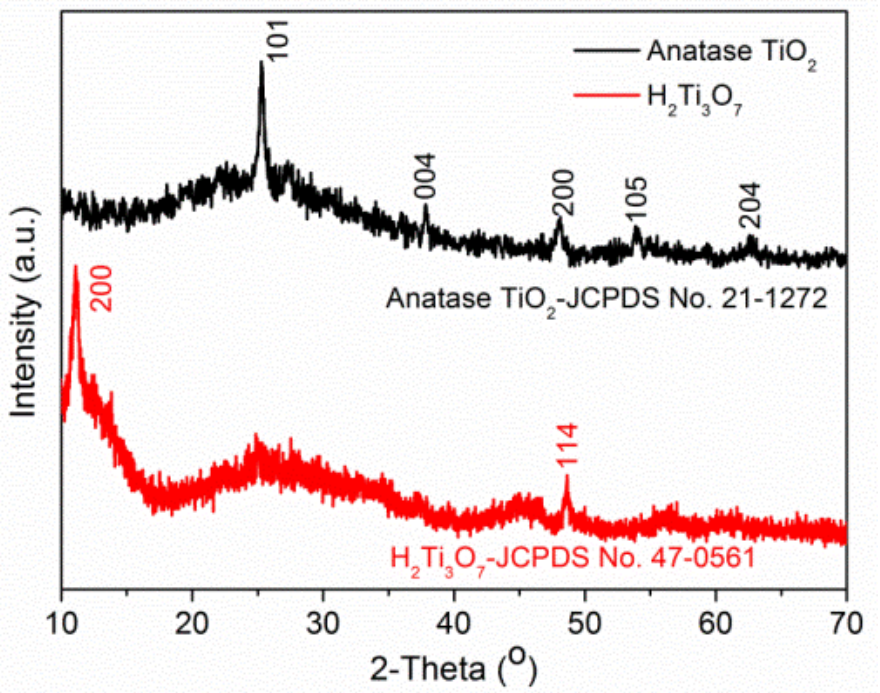

Figure S1. XRD patterns of titanate nanowires (red) which transform into anatase TiO_2 (black) after hydrothermal treatment at 180 ^oC for 24h if no $SnCl_2$ and NaF are present in the reaction mixture. The XRD pattern reveals that the titanate nanowires can be indexed to the trititanate phase in the monoclinic C2/m space group using the $H_2Ti_3O_7$ unit cell parameters. The trititanate phase has unit layers composed of three edge-shared TiO_6 octahedra, in which each unit of three TiO_6 octahedra is weakly linked through corner sharing.[1]

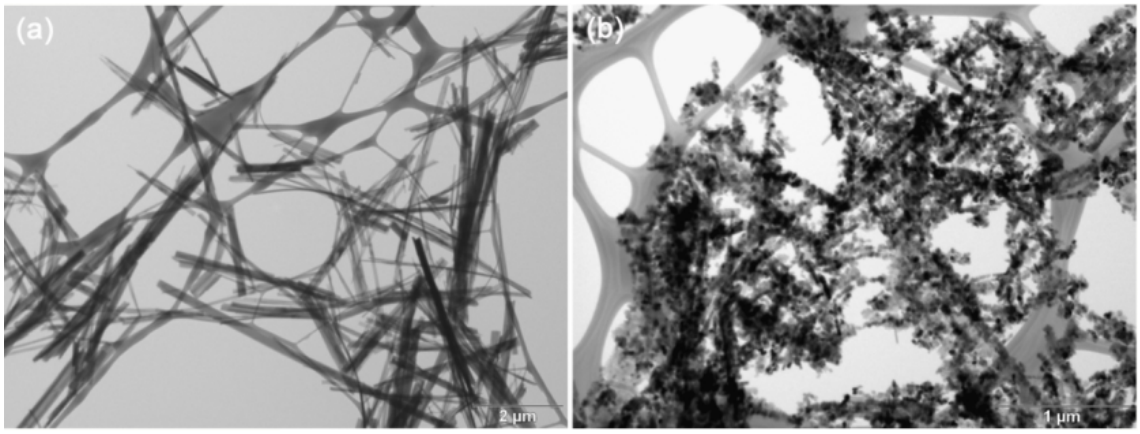

Figure S2. TEM images of (a) titanate nanowires which transform into (b) anatase TiO_2 after hydrothermal treatment at 180 ^oC for 24h if no $SnCl_2$ and NaF are present in the reaction mixture.

Table S1. d-spacings determined from the XRD patterns of Ti-doped SnO_2, compared to those of tetragonal SnO_2 (cassiterite, JCPDS#41-1445). The lattice parameters of Ti-doped SnO_2 are $a = b = 4.7120$ Å, $c = 3.1458$ Å and the volume of the unit cell V = 69.822 $Å^3$, which is decreased by 2.4% as compared to SnO_2.

(Å)	Ti-doped SnO_2	JCPDS#41-1445
d_{110}	**3.31705**	3.3470
d_{101}	**2.61830**	2.6427
d_{200}	**2.35723**	2.3690
d_{211}	**1.74911**	1.7641
d_{220}	**1.66543**	1.6750
d_{221}	**1.49292**	1.4829
d_{301}	**1.40713**	1.4155
a=b	**4. 7120**	4.738
c	**3.1458**	3.187
V=a*b*c ($Å^3$)	**69.844**	71.544

Table S2. XPS analysis of Sn(II)-doped and Ti(IV)/Sn(II) co-doped SnO_2.

	Binding energy (eV)		Atomic concentration (%)	
	Undoped	Doped	Undoped	Doped
Sn 3d	487.4	487.2	27.90	25.42
O 1s	531.3	531.0	52.45	57.09
F 1s	685.3	684.8	3.80	3.20
Ti 2p	---	459.5	---	4.65
C 1s	285.1	285.0	15.85	9.63

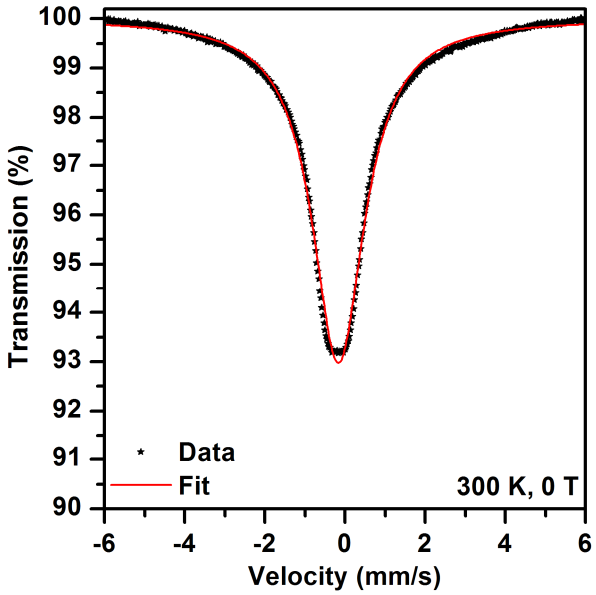

Figure S3. Room-temperature Mössbauer spectrum of Ti(IV)/Sn(II) co-doped SnO_2 after calcination at 500 ^{o}C in air for 2h. The hyperfine parameters correspond to Sn(IV) component.

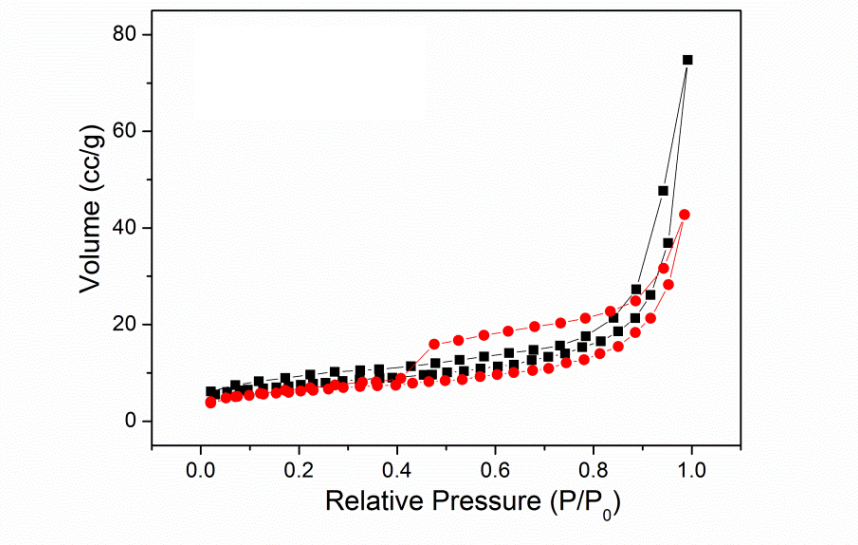

Figure S4. Nitrogen adsorption and desorption isotherms of hierarchical Sn(II)-doped SnO_2 nanoflowers (red line and points) and Ti(IV)/Sn(II) co-doped SnO_2 nanowires (black line and points).

Reference

[1] H. K. Wang, W. Shao, F. Gu, L. Zhang, M. K. Lu, C. Z. Li, *Inorg. Chem.* **2009**, 48, 9732.