Electronic Supplementary Material (ESI) for Nanoscale Advances.

Supporting Information

Photoelectrochemical performance of facet-controlled TiO_2 nanosheets grown hydrothermally on FTO

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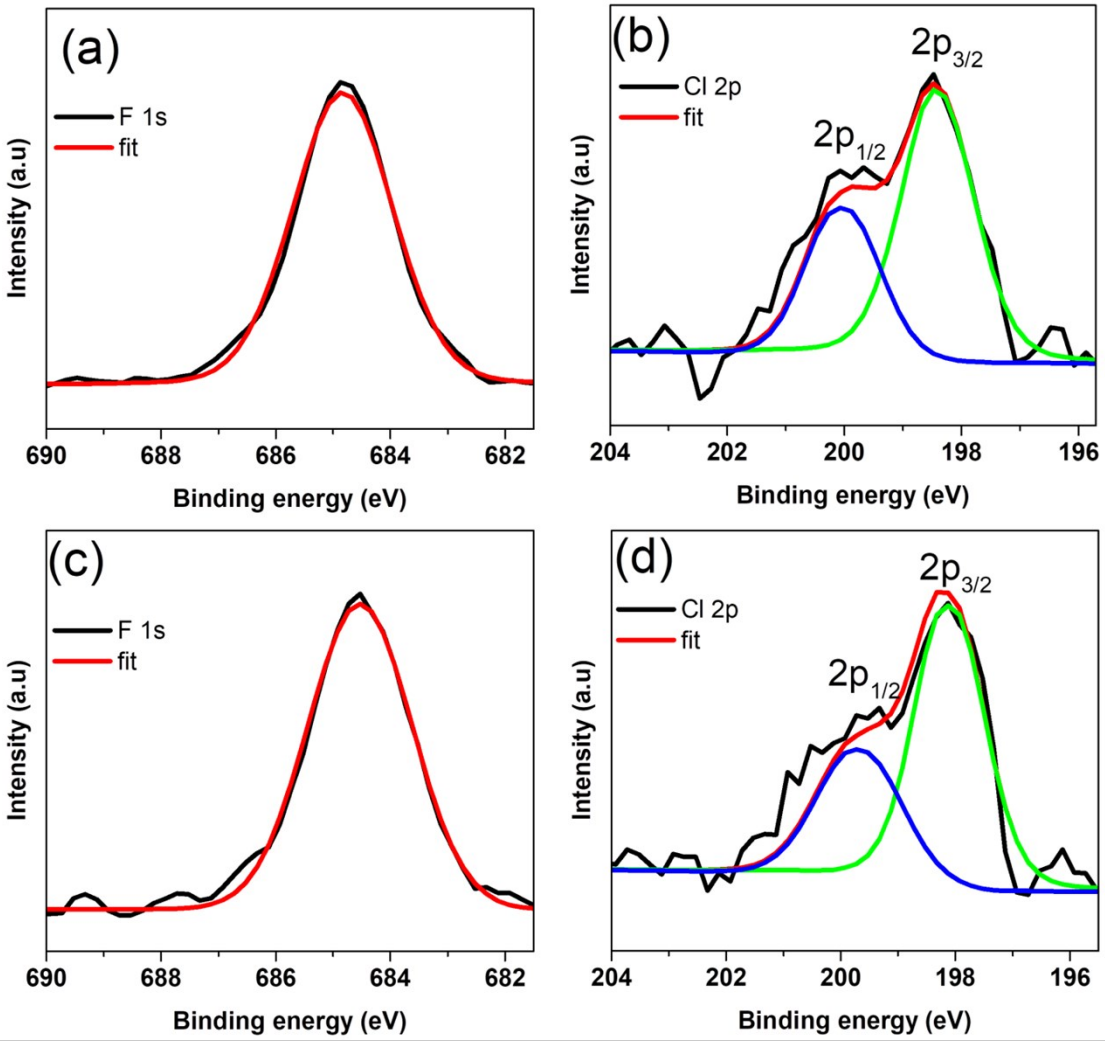


(e) **at% (XPS)**

Sample	Ti	O	C	Sn	F	Cl
HCl/DI:30/30	25.38	56.44	10.13	0.12	7.58	0.34
HCl/DI:33/27	22.13	56.16	15.43	0.61	4.96	0.71

Fig. S1. XPS spectra for (a) F 1s and (b) Cl 2p region of samples grown with the basic recipe (a,b), and of sample grown with higher concentration of HCl (HCl to DI of 33:27), (c,d) and

surface atomic concentration determined from XPS data (e). Evident is a different level of fluoride termination for the two samples but only a very weak influence of chloride.

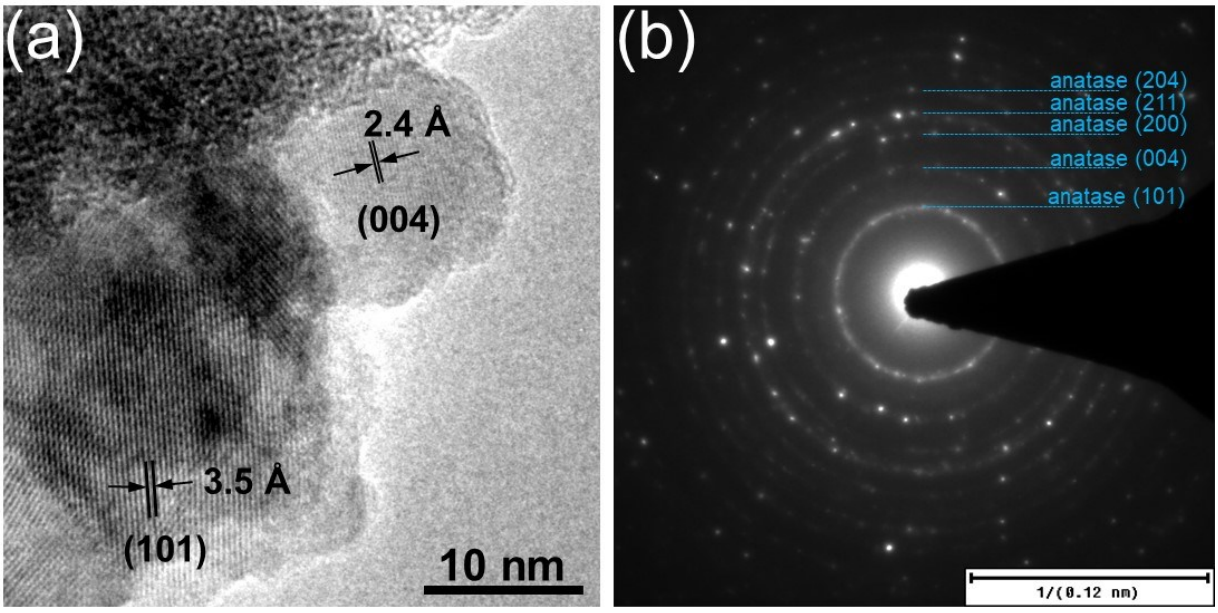
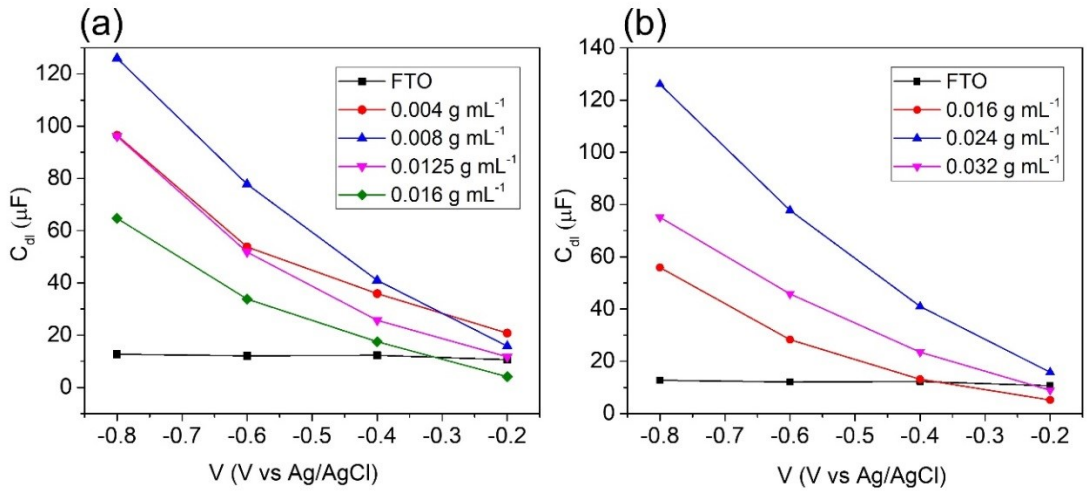


Fig. S2. HR-TEM image (a) and the corresponding SAED pattern (b) for the anatase TiO_2 nanosheets grown by hydrothermal treatment using the basic recipe at 150 °C for 15 h.



(c)

Sample	R_s (Ω)	R_{ct} (kΩ)	CPE		Normalized Surface Area*
			C_{dl} (µF)	a	
FTO	83	252	12.3	0.97	0.3
0.004 g mL^{-1}	109	64	35.9	0.95	0.9
0.008 g mL^{-1}	119	243	41	0.96	1
0.0125 g mL^{-1}	139	146	25.7	0.93	0.6
0.016 g mL^{-1}	330	530	17.5	0.96	0.4

*$A/A_0 = C/C_0$

(d)

Sample	R_s (Ω)	R_{ct} (kΩ)	CPE		Normalized Surface Area*
			C_{dl} (µF)	a	
FTO	83	252	12.3	0.97	0.3
0.016 g mL^{-1}	620	509	13.1	0.96	0.3
0.024 g mL^{-1}	119	243	41	0.96	1
0.032 g mL^{-1}	97	906	23.5	0.96	0.6

*$A/A_0 = C/C_0$

Fig. S3 Double layer capacitance as a function of voltage for TiO_2 nanosheets for (a) different concentrations of F precursor, (b) different concentrations of Ti precursor (c) Impedance parameters at -0.4 V for TiO_2 nanosheets at different concentrations of F precursor, (d) Impedance parameters at -0.4 V for TiO_2 nanosheets at different concentrations of Ti precursor.

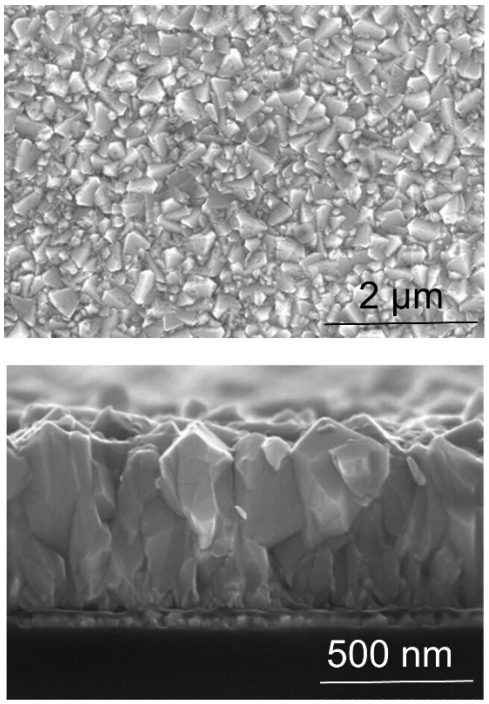
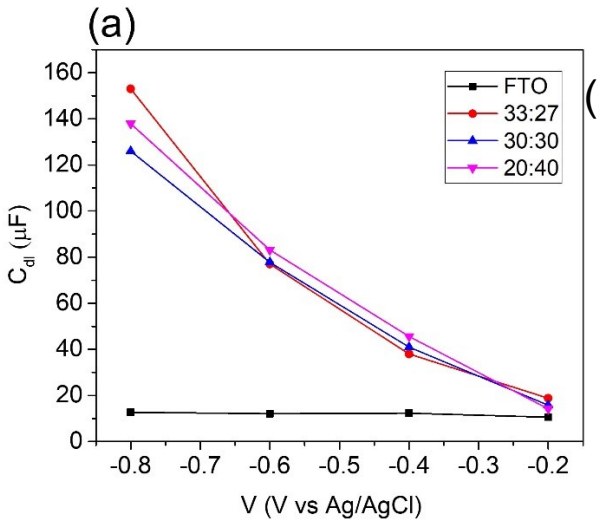


Fig. S4 Top view and cross-sectional SEM images of TiO_2 nanosheets grown on FTO at HCl to DI water: 40/20.



(b)

Sample	R_s (Ω)	R_{ct} (kΩ)	CPE		Normalized Surface Area*
			C_{dl} (μF)	a	
FTO	83	252	12.3	0.97	0.3
33:27	107	183	38	0.96	0.9
30:30	119	243	41	0.96	1
20:40	91	1100	45.6	0.91	1.1

*$A/A_0 = C/C_0$

Fig. S5 (a) Double layer capacitance as a function of voltage for TiO_2 nanosheets grown with different ratios of HCl to DI water, (b) Impedance parameters at -0.4 V.