

Supporting Information

Synergistic Effect of Ti^{3+} Doping and Facet Regulation over Ti^{3+} Doped TiO_2 Nanosheets with Enhanced Photoreactivity

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Additional figures

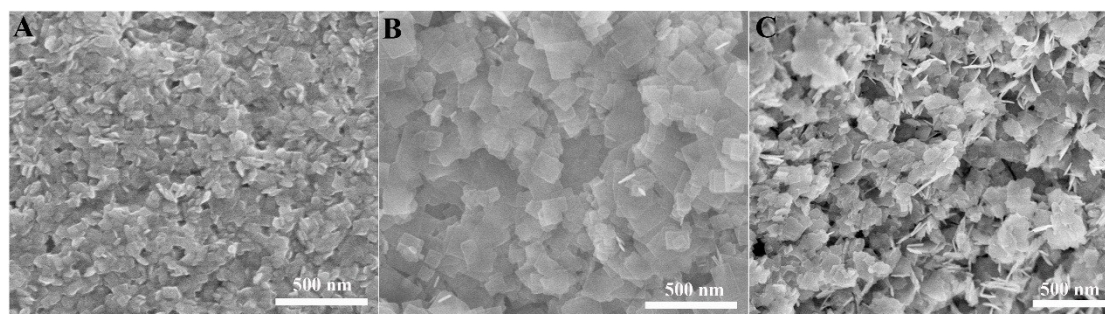


Fig.S1 SEM images of Air-TiO₂-HF4.5 (A), Air-TiO₂-HF6 (B) and Air-TiO₂-HF9(C).

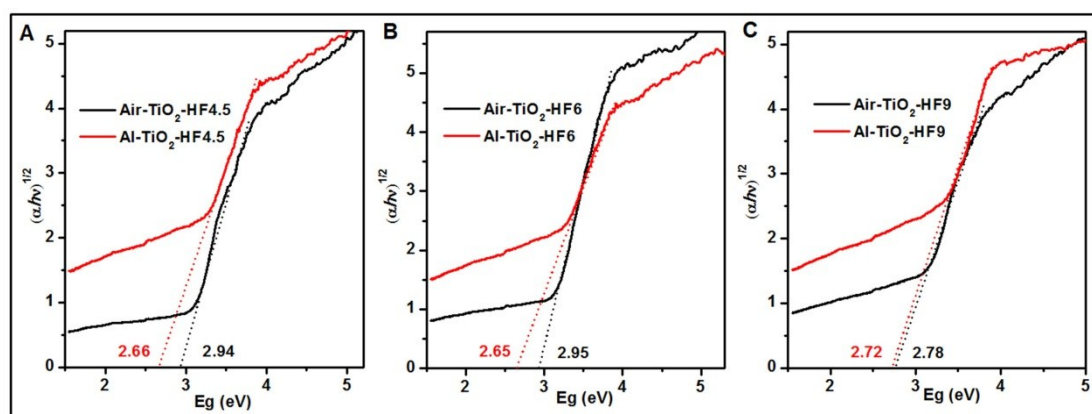


Fig. S2 Curves of the Kubelka–Munk function plotted against the photon energy for the samples before (black line) and after (red line) Al reduction with different volume of HF: A) 4.5 mL, B) 6 mL, and C) 9 mL.

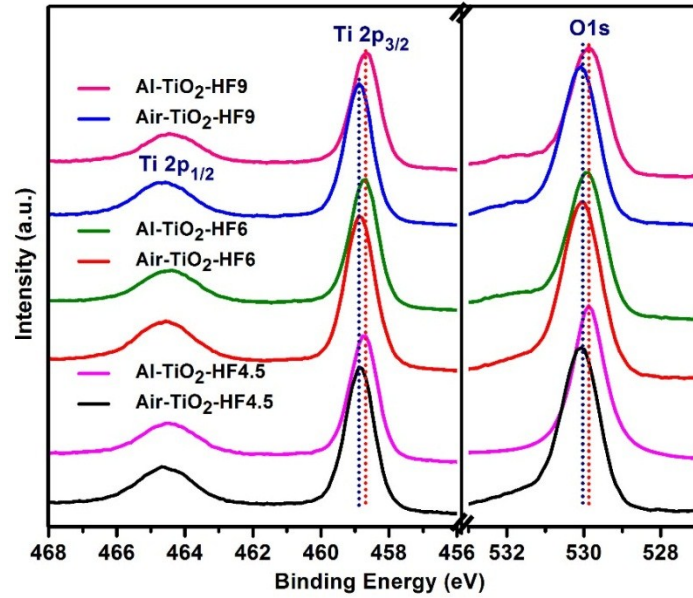


Fig. S3 High resolution XPS spectra of Ti 2p and O 1s XPS spectra of TiO₂ nanosheets treated before and after Al reduction.

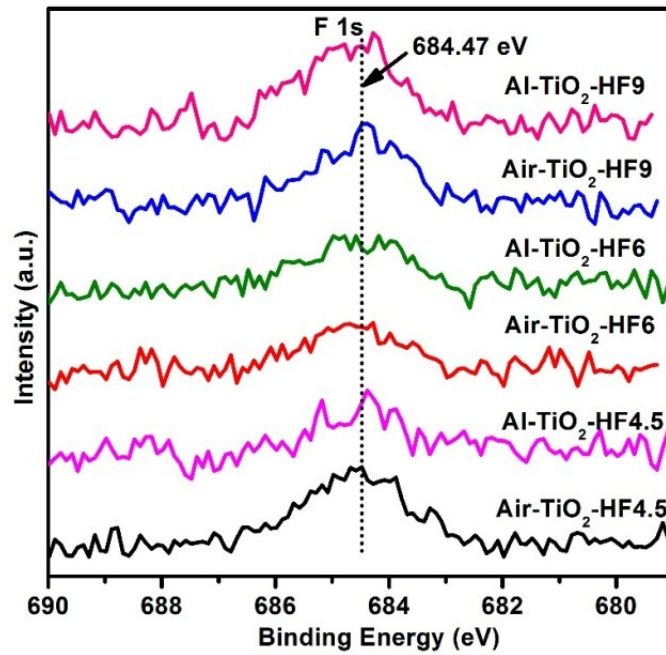


Fig. S4 (A) F 1s XPS spectra of pristine TiO₂ and Al reduced TiO₂

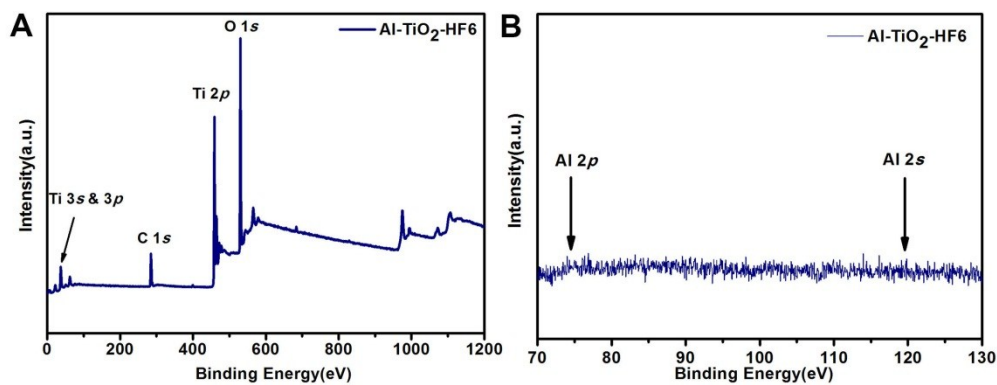


Fig. S5 XPS survey spectra and Al element analysis of of Al-TiO₂-HF6 sample.

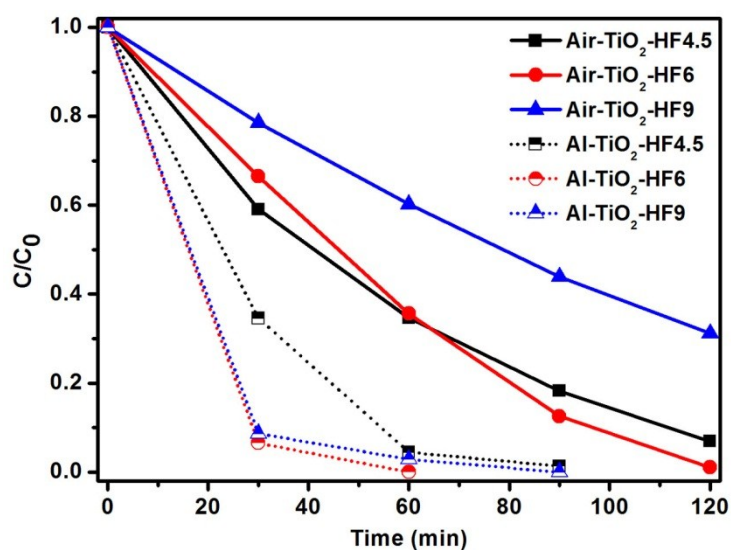


Fig. S6 UV-vis light induced photocatalytic degradation of methylene orange of as prepared TiO₂ nanosheets treated before and after Al reduction.

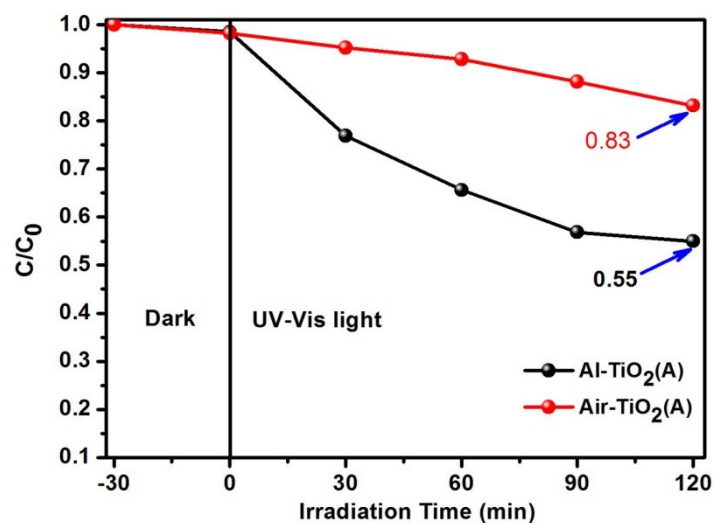


Fig. S7 UV-vis light induced photocatalytic degradation of methylene orange of Al-TiO₂(A) and Air-TiO₂(A) samples.

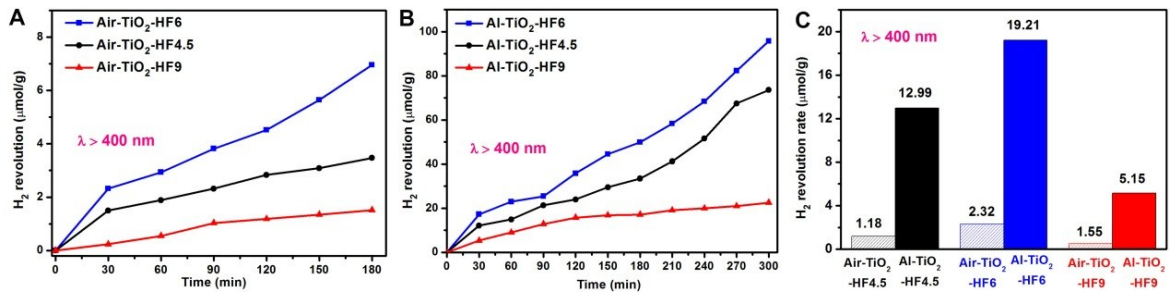


Fig. S8 Photocatalytic H₂ evolution over TiO₂ treated (A) before and (B) after Al reduction and their comparative study of H₂ evolution rates (C) under visible light irradiation ($\lambda > 400$ nm)

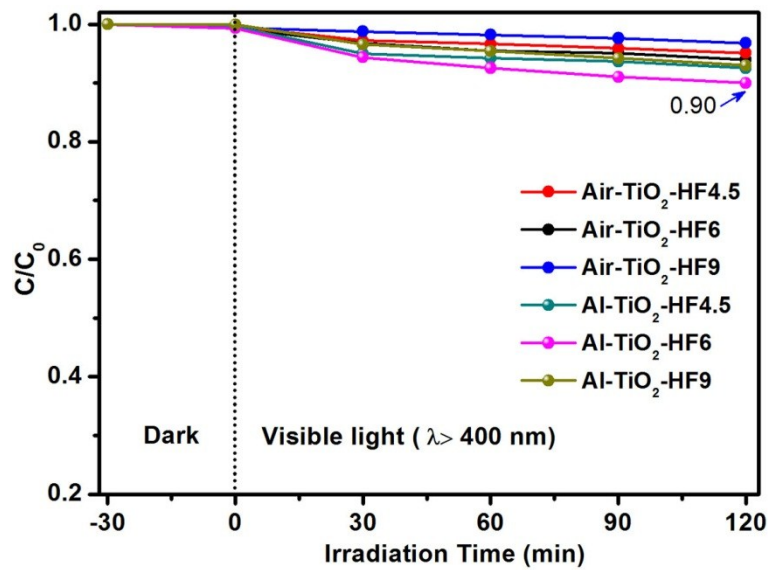


Fig. S9 Visible light ($\lambda > 400$ nm) induced photocatalytic degradation of methylene orange of as prepared TiO₂ nanosheets treated before and after Al reduction.

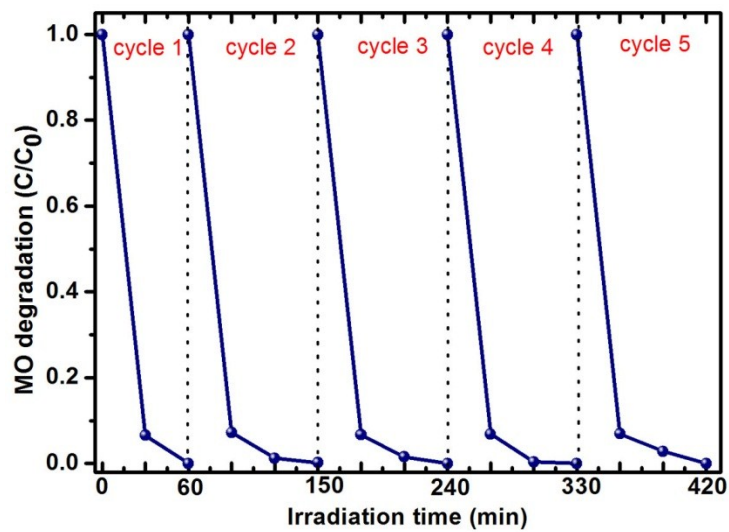


Fig.S10 Stability tests of UV-vis light irradiation induced photocatalytic activities (MO decomposition) of the as prepared Al-TiO₂-HF6 nanosheets.

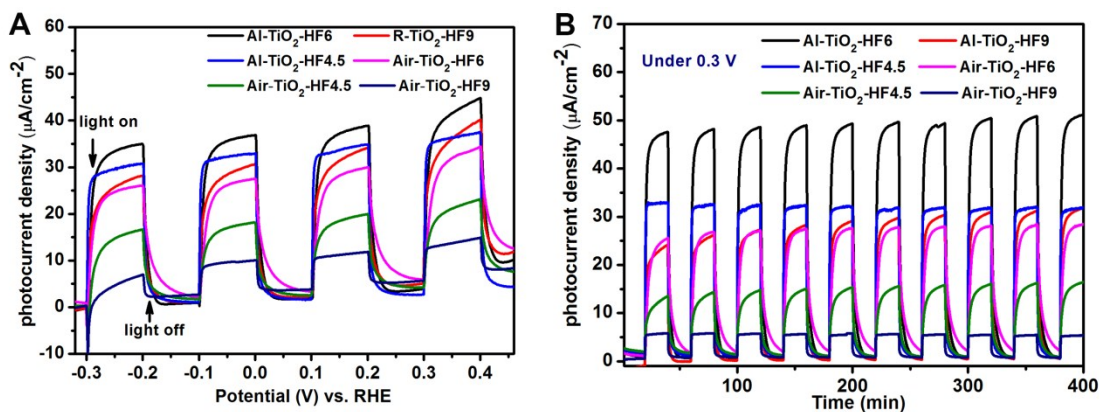


Fig. S11 Photoelectrochemical properties of pristine TiO₂ and Al-reduced TiO₂ electrodes: (A) chopped $J-V$ curves and (B) $I-t$ amperometric curves under UV-Vis light illumination using a three electrode setup (TiO₂ working, Pt counter, saturated calomel reference electrode) in a 1 M NaOH electrolyte.

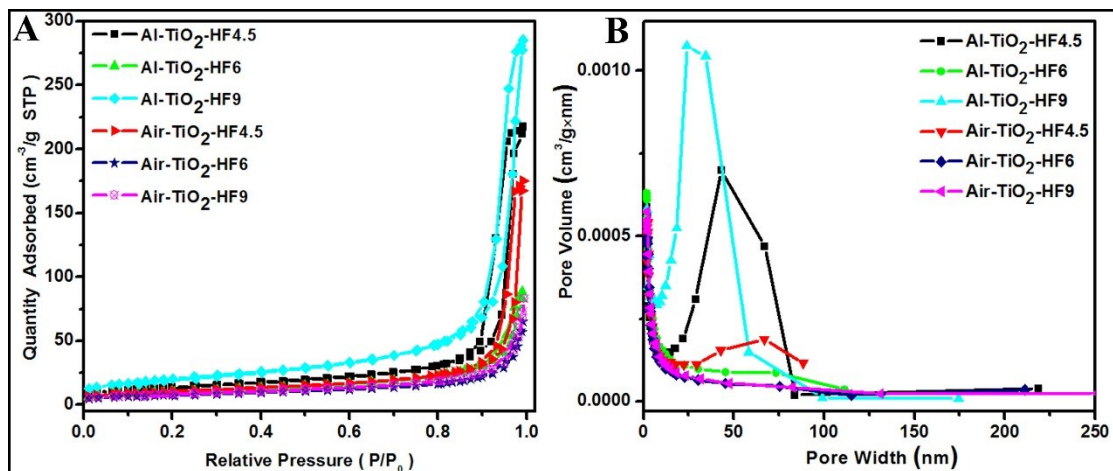


Fig. S12 N₂ adsorption-desorption isotherm (A) and pore size distribution (B) of prepared TiO₂ nanosheets samples before and after Al reduction.

Table S1. Structural information of as-synthesized Al reduced TiO₂ nanosheets synthesized at different reaction conditions.

sample	Average Thickness (nm)	Average Length (nm)	Percentage of {001} Facet
Al-TiO ₂ -HF4.5	7.2	40-50	58
Al-TiO ₂ -HF6	5.9	120-150	72
Al-TiO ₂ -HF9	5.1	50-60	83

Table S2. Structure information of BET specific surface areas, average pore width and total pore volume for as prepared TiO₂ samples before and after Al reduction

Sample	BET specific surface areas (m ² /g)	Average pore width (nm)	Total pore volume (cm ³ /g)
Air-TiO ₂ -HF4.5	37.48	8.95	0.083895
Al-TiO ₂ -HF4.5	49.86	22.42	0.279436
Air-TiO ₂ -HF6	73.86	15.12	0.279157
Al-TiO ₂ -HF6	26.45	8.42	0.05783
Air-TiO ₂ -HF9	29.39	8.62	0.066025
Al-TiO ₂ -HF9	39.61	10.89	0.103493