

Supplementary Information

Simultaneous production of hydrogen with the degradation of organic pollutants using TiO₂ photocatalyst modified with dual surface components

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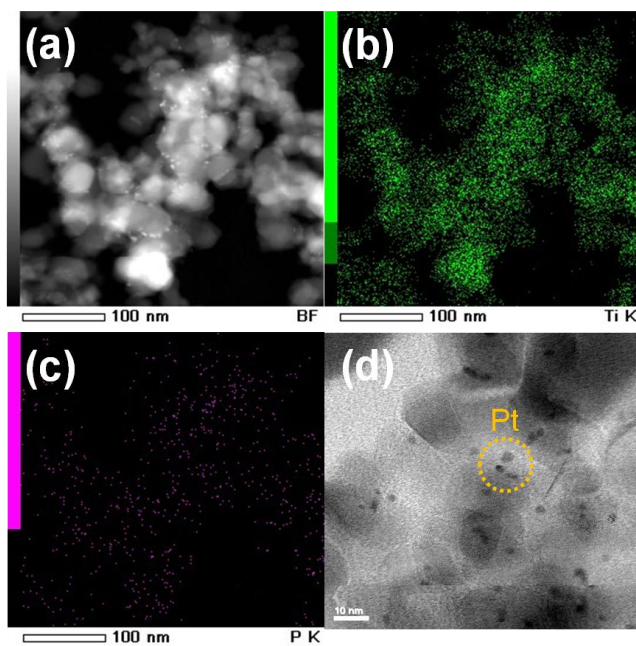


Fig. S1 EDX and HRTEM images of P-TiO₂/Pt sample (with 1wt% Pt and 30 mM H₃PO₄). (a) the scanning TEM bright field image; the elemental mapping of (b) Ti and (c) P, and (d) HRTEM image.

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Table S1 Surface adsorbed F⁻ on TiO₂ (%) as a function of [NaF] and pH^a

pH	1 mM	2.5 mM	5 mM	10 mM
3	87.6	94.6	97.2	98.6
6	5.9	13.5	23.8	38.4
9	2.1×10^{-3}	5.3×10^{-3}	1.1×10^{-2}	2.1×10^{-2}
11	3.2×10^{-7}	7.9×10^{-7}	1.6×10^{-6}	3.2×10^{-6}

^a Calculations were done using the pK values from reference #28.

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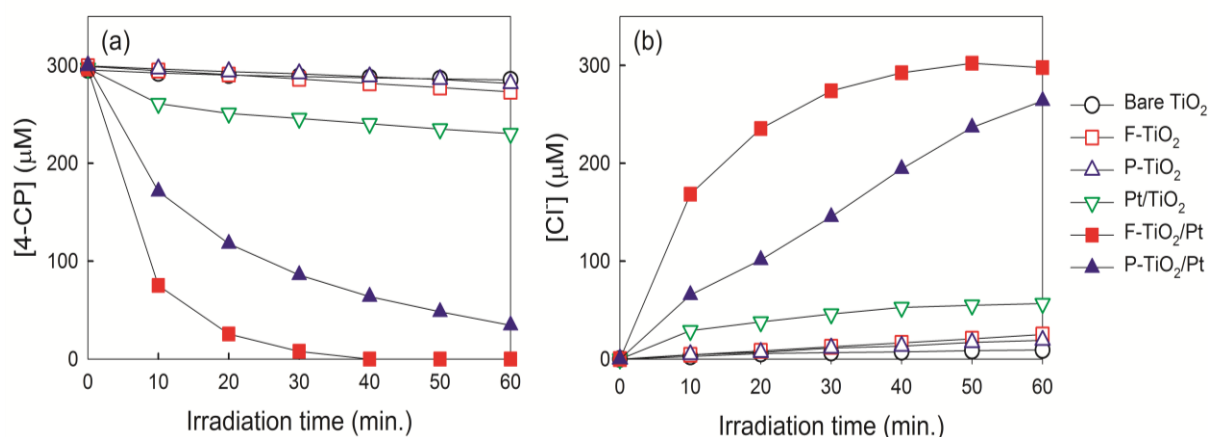


Fig. S2 (a) Anoxic degradation of 4-CP and (b) the concurrent production of chloride in the suspension of bare TiO₂, F-TiO₂, P-TiO₂, Pt/TiO₂, F-TiO₂/Pt, and P-TiO₂/Pt. Experimental conditions: [catalyst] = 0.5 g L⁻¹, [4-CP]₀ = 300 μM, [NaF] = 10 mM, pH_i = 3.0, λ > 320 nm irradiation, and continuously Ar purged during irradiation.

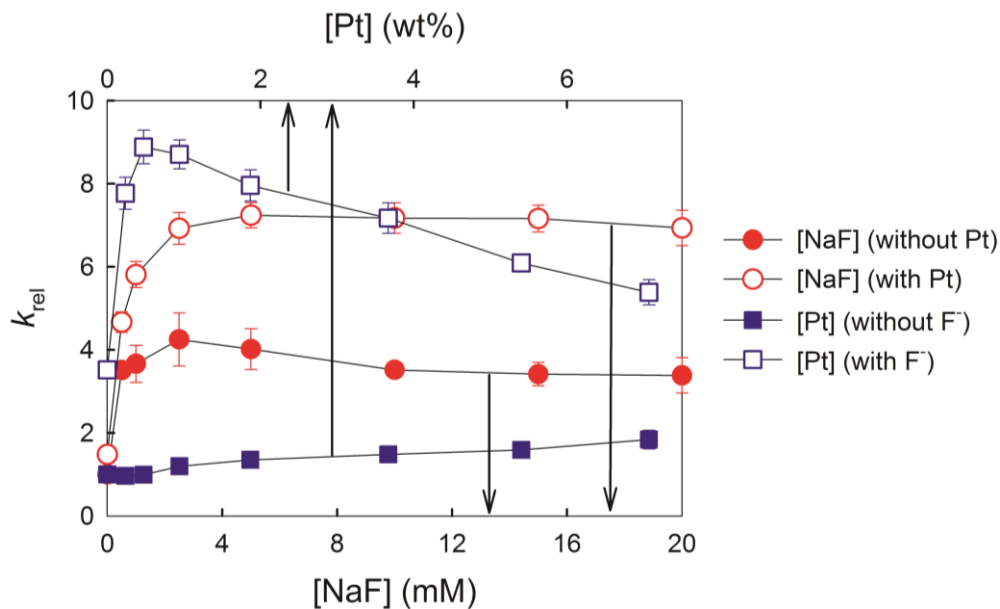


Fig. S3 Relative activity (k_{rel}) for the photocatalytic degradation of 4-CP in air-equilibrated condition depending on [NaF] (with 3.7wt% Pt/TiO₂) and Pt loading (with NaF 10 mM). The relative activities are expressed as: $k_{rel} = (\text{catalyst})_{activity}/(\text{bare TiO}_2)_{activity}$. Experimental conditions: [catalyst] = 0.5 g L⁻¹, [4-CP]₀ = 500 μM, pH_i = 3.0, and λ > 320 nm irradiation.