Electronic Supplementary Information (ESI) for Chemical Communications

Synergic Effect of Simultaneous Fluorination and Platinization of TiO_2 Surface on Anoxic Photocatalytic Degradation of Organic Compounds

Jungwon Kim, Jaesang Lee, and Wonyong Choi*

School of Environmental Science and Engineering, Pohang University of Science and Technology, Pohang, 790-784, Korea

E-mail: wchoi@postech.ac.kr

Experimental analyses

XPS (X-ray photoelectron spectroscopy, Kratos XSAM 800pci) spectrum of F-TiO_2/Pt powder was obtained using the Mg Kα line (1253.6 eV) as the excitation source. The Pt content on TiO_2 was estimated by comparing the aqueous concentrations of chloroplatinic acid (Pt precursor) before and after the photodeposition using inductively coupled plasma mass spectrometry (ICP-MS, Perkin Elmer Elan 5000A). Quantitative analyses of substrates and intermediates were done by using a high performance liquid chromatograph (HPLC, Agilent 1100) equipped with a C-18 column (Agilent Zorbax 300SB, 4.6 mm × 150 mm) and a diode-array detector. Quantification of chlorides was performed by using an ion chromatograph (IC, Dionex DX-120) that was equipped with a Dionex IonPac AS 14 column (4 mm × 250 mm) and a conductivity detector. TOC was measured using a total organic carbon analyzer (TOC-VCSH, Shimadzu). Photocurrents were measured with a potentiostat (EG&G 263A2).

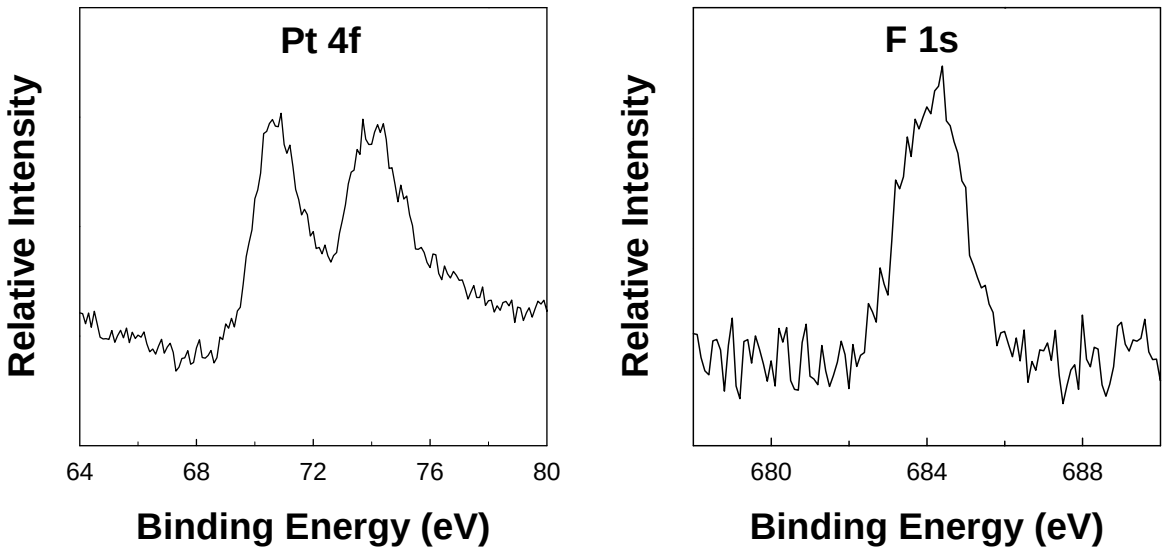

Fig. S1 XPS spectra of F-TiO_2/Pt powder.

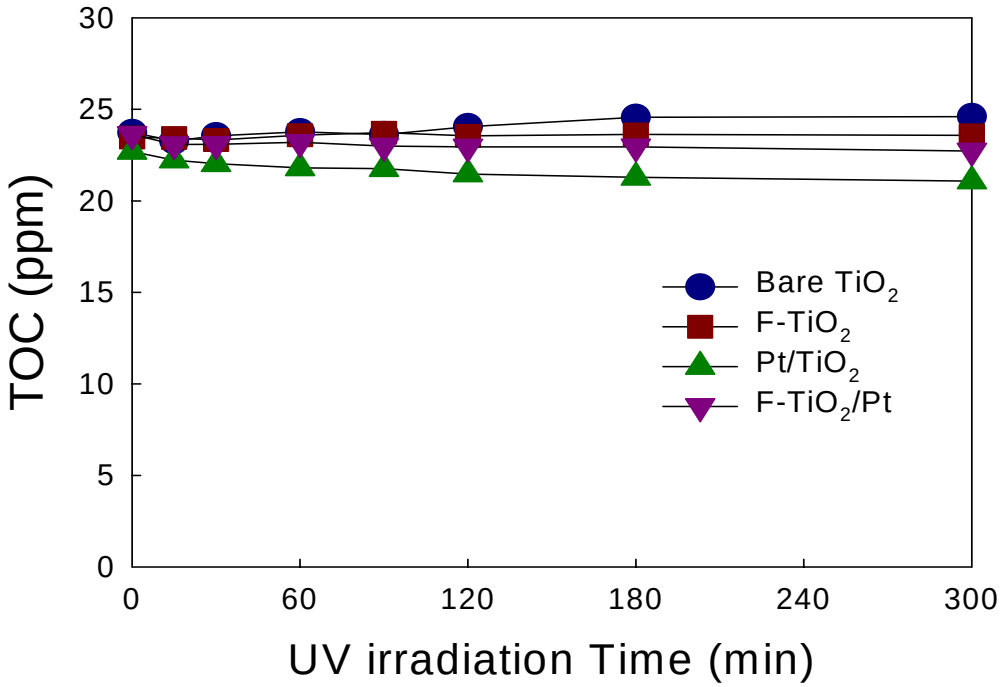

Fig. S2 Total Organic Carbon (TOC) content variation in the anoxic suspension of bare TiO_2, F-TiO_2, Pt/TiO_2, and F-TiO_2/Pt under UV irradiation. Experimental conditions: [catalyst] = 0.5 g/L, [NaF] = 10 mM, $[4\text{-CP}]_0$ = 300 μM, Reactor volume = 90 mL, pH = 3.0, $\lambda > 300$ nm, Continuously N_2 purged.

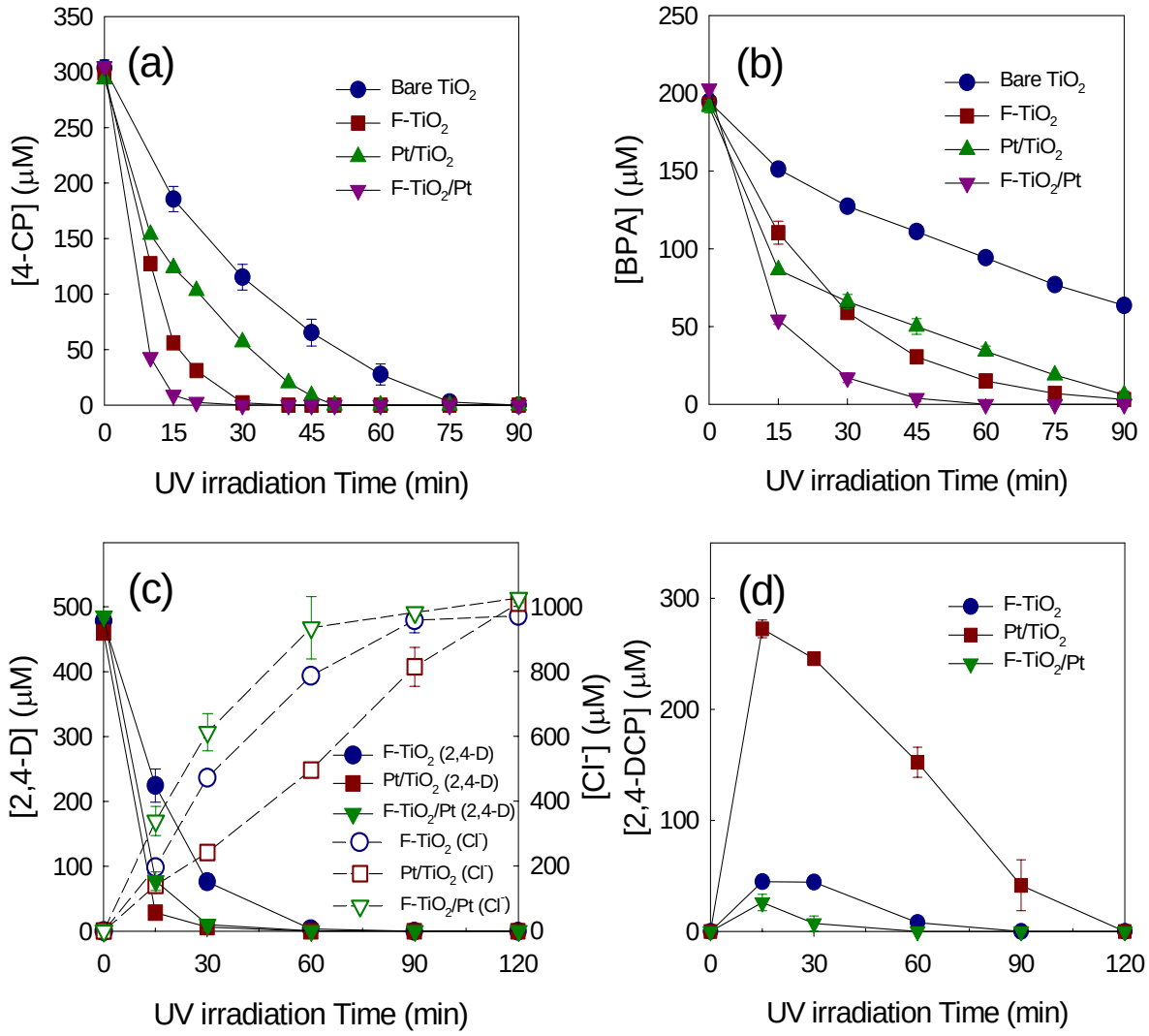

Fig. S3 Photocatalytic degradation of (a) 4-CP and (b) BPA, (c) 2,4-D, and (d) the concurrent production of 2,4-DCP intermediate from the degradation of 2,4-D in air-equilibrated suspension of bare TiO_2, F-TiO_2, Pt/TiO_2, and F-TiO_2/Pt. Experimental conditions: [catalyst] = 0.5 g/L, [NaF] = 10 mM, Reactor volume = 30 mL, pH = 3.0, $\lambda > 300$ nm, air-equilibrated.