Influence of Formate Adsorption and Protons on Shallow Trap Infrared Absorption (STIRA) of Anatase TiO_2 During Photocatalysis

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Supplementary Information

Scanning Electron Microscopy:

Samples were loaded into an SEM cross-sectional holder and coated with approximately 10 nm of gold palladium in an Emitech K575X Peltier-cooled high resolution sputter coater (EM Technologies Ltd, Kent, England). Samples were viewed in a JEOL JSM-6700F field emission scanning electron microscope (JEOL Ltd, Tokyo, Japan) at an accelerating voltage of 5 kV, using the LEI (lower secondary detector) and SEI (upper secondary detector).

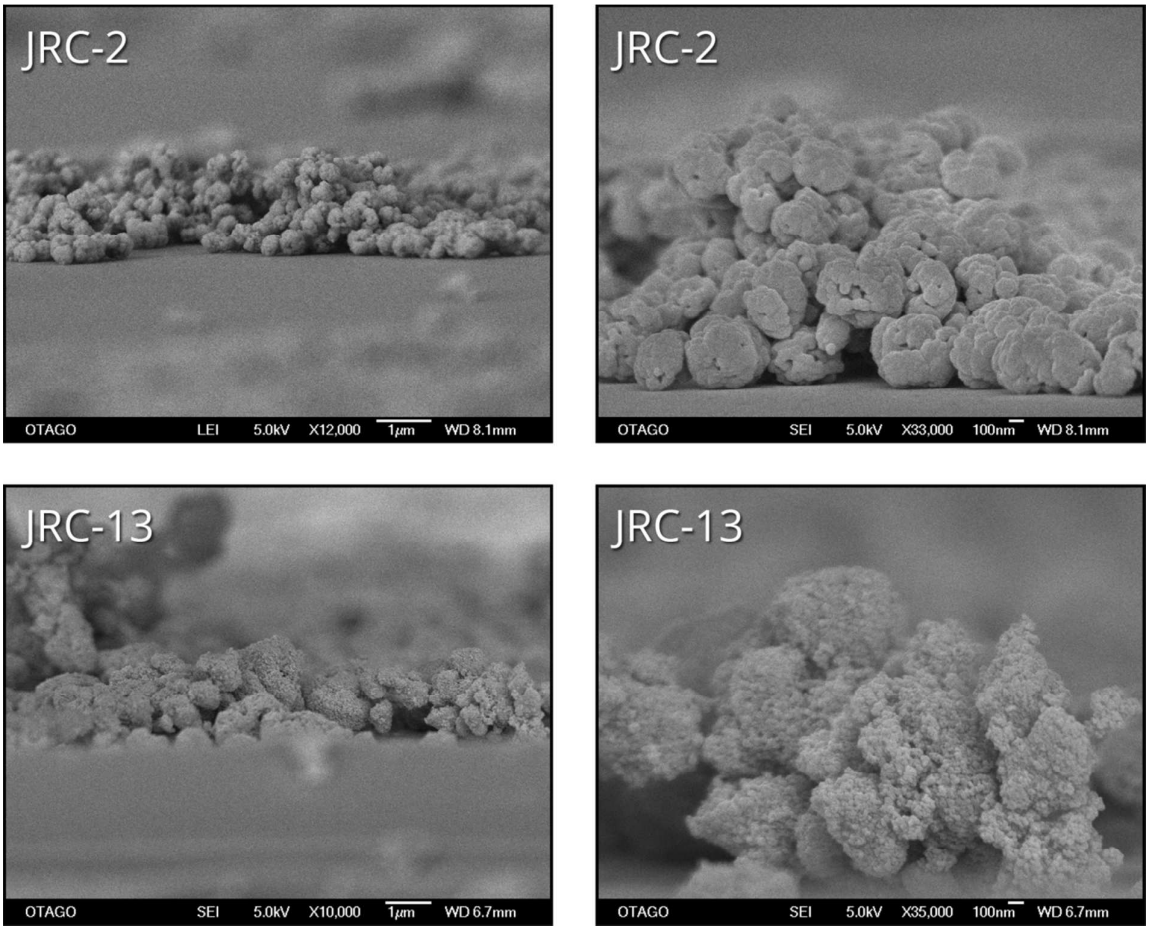

Figure 1: Scanning electron micrograph images of JRC-TiO-2, 13 films of comparable thickness to those used in ATR-IR experiments.

Static UV Irradiation Accessory:

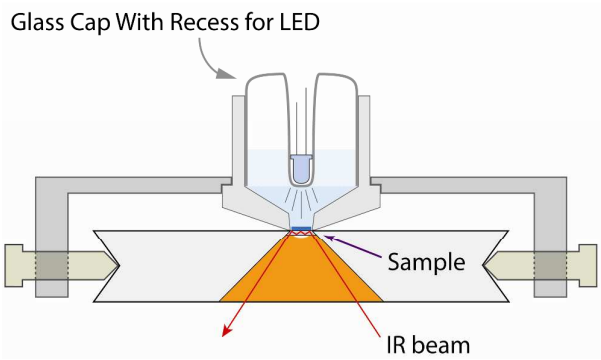

Figure 2: Cell for irradiation of anatase TiO_2 under oxygen-free static solution conditions. A tapered conical base constructed of Kel-F material isolates the diamond prism surface and houses up to ~10 mL of liquid. A glass lid enables sealing of the system, positioning of an LED above the sample, and has small ports allowing for argon sparging of the solution.

Zeta Potential Measurements:

Zeta potential measurements were performed using a Zetasizer Nano ZS90 (Malvern, UK) instrument with 173° backscatter and MPT-2 autotitrator. TiO_2 powder was suspended in pH 2.5 HCl giving 1 mg mL^{-1} TiO_2 and sonicated for 15 minutes. The suspension was subsequently probed in a folded capillary cell and zeta potential measured following titration with NaOH.

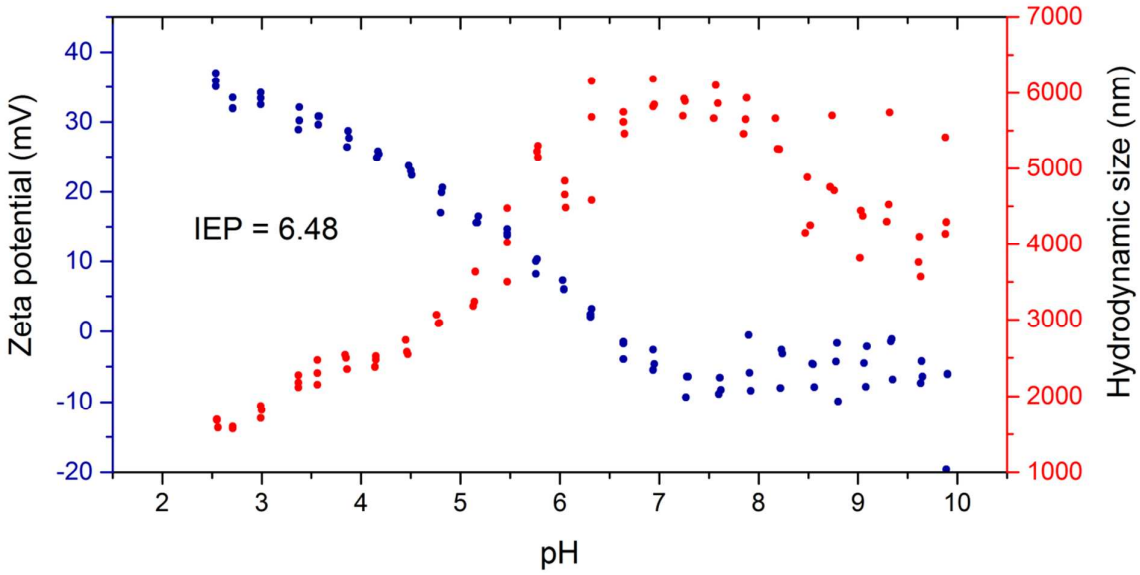

Figure 3: Zeta potential measurements of JRC-TiO-2 showing point of zero charge near pH 6.5.

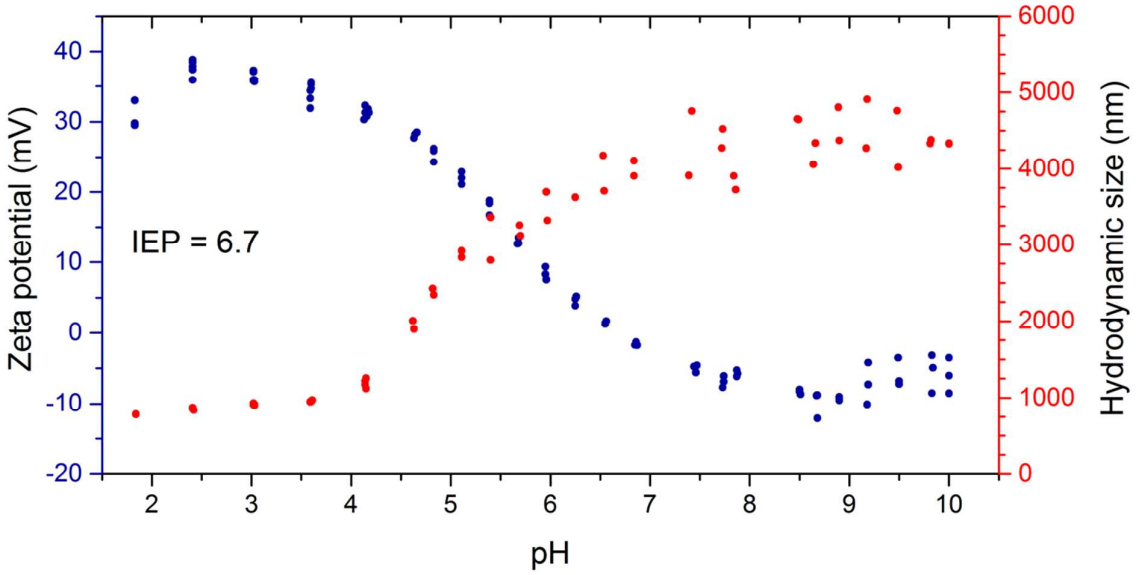

Figure 4: Zeta potential measurements of JRC-TiO-13 showing point of zero charge near pH 6.7.