Supporting Information

Surface area evaluation of TiO_2 nanosheets

Because the saturation absorption of dye on TiO_2 surface is proportional to their BET surface area, dye adsorption measurements can be a simple means of estimating the surface area of TiO_2 film. In the adsorption measurements, as-fabricated TiO_2 films are immersed in 0.2 mM solution of *cis*-bis (isothiocyanato)bis(2,2´-bipyrridyl-4-4´-dicarboxylato)-ruthenium (II) bis-tetrabutylammonium dye (N719 dye as received from Solaronix) in ethanol for 2 days. After dyeing, the films are rinsed with pure ethanol and dried in ambient air for 30 min. The amount of adsorbed dye is determined after desorption with 25 ml of 0.01 M NaOH solution. After measurment, the absorbance of dye desorption solution decreases in the following order: TR0>TR1>TR2>TR3. The roughness factor of above samples can be calculated from following formula:

$$R = \frac{A \times 25 \times 10^{-3} l \times 6.02 \times 10^{23} \times 1.6 \times 10^{-18} m^2}{1.4 \times 10^4 l \cdot mol^{-1} cm^{-1} \times 1 cm \times 1.5 \times 2 \times 10^{-4} m^2}$$

In the formula, A represents the absorbance of dye desorption solution. 1.6×10^{-18} represents the area of a single N719 dye molecule. 1.4×10^4 represents the absorbance coefficient of N719 dye. The length and width of the film is 1.5 cm and 2 cm, respectively. Accordingly, the surface area ratio is proportional to the adsorption of dye on the catalyst surface. The ratio of concentration of dye adsorbed onto sample is TR0: TR1: TR2: TR3=1:0.6667:0.4167:0.2500. It can be deduced that the surface area of TiO_2 film decreases with the increase of NaCl concentration during hydrothermal synthesis.