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Supporting Information:

Graphene/TiO_2 hybrid layer for simultaneous detection and degradation by a one-step transfer and integration method

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Preparation of the TiO_2 powder

In a typical preparation process of the TiO_2 powder, 5 ml Titanium butoxide was added to 17.5 ml ethanol. After stirring for 10 min, faint yellow solution was obtained and labeled as solution A. Then add 2 ml acetic acid and 5 ml deionized water to another 17.5 ml ethanol. After vigorous stirring, add a drop of hydrochloric acid and labeled as solution B. Add the solution A to solution B drop by drop and keep stirring for 30 min. Let the solution stand to obtain TiO_2 gel and dried at 60°C for about 10 hours. Then anneal it at 300°C for 1h.

Characterization of the photocatalysis performance

The photocatalytic degradation experiment was carried out in a self-prepared device. In the photocatalytic degradation procedure, 200 mg TiO_2 was added in 100 ml methyl orange aqueous solution (10 mg/L). Before irradiation by a 350 W xenon lamp (XQ350W, Lansheng electronics co., LTD, Shanghai, Chain), the mixed solution was stirred for 20 min to get the adsorption equilibrium of the methyl orange molecules on catalyst surface. The vertical distance between the solution and the horizontal plane of the lamp was about 10 cm (the excitation power density is 160 mW/cm^2). Upon irradiation, the methyl orange solution was kept stirring after switching on the xenon lamp. At an interval of 10 min, about 5 ml of solution is taken out from the reactor. The absorbance of the solution was determined by a UV-Vis absorption photometer (UV-3200S, MAPADA analytic apparatus LTD. Inc., Shanghai, Chain). With the increase of the irradiation time, the intensity of the UV-vis absorption spectra decreased. It could be found that the photodegradation percentages for the TiO_2 powder is 28%, 55%, 78% and 93%, respectively after 10 min, 20 min, 30 min and 40 min irradiation.

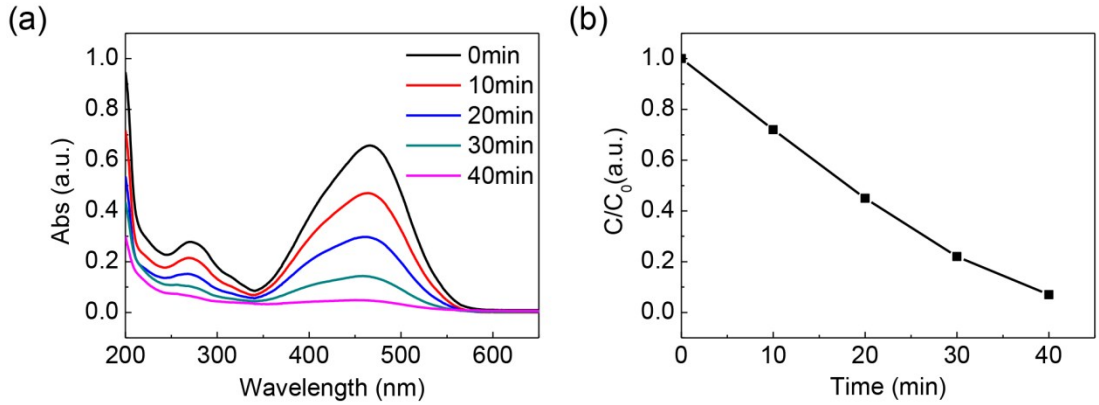

Figure S1. (a) UV-vis absorption spectra of methyl orange aqueous solution after irradiation for a series of time. (b) Photodegradation percentages for methyl orange aqueous solution after irradiation for a series of time.

Characterization the interactions between TiO_2 and graphene

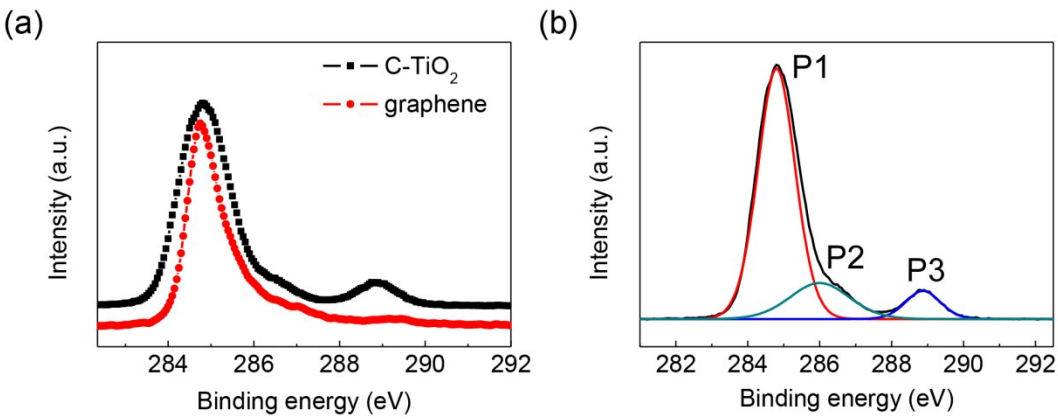

Figure S2. (a) The XPS of graphene/TiO_2 hybrid layer (C-TiO_2) and graphene transferred by PMMA. (b) The C 1s peak of graphene/TiO_2 hybrid layer is fitted by three components at 284.7 eV, 286.0 eV and 288.8 eV.