Electronic Supplementary Material (ESI) for Green Chemistry.

Highly photoactive, visible-light-driven graphene/ 2D mesoporous TiO_2 photocatalyst

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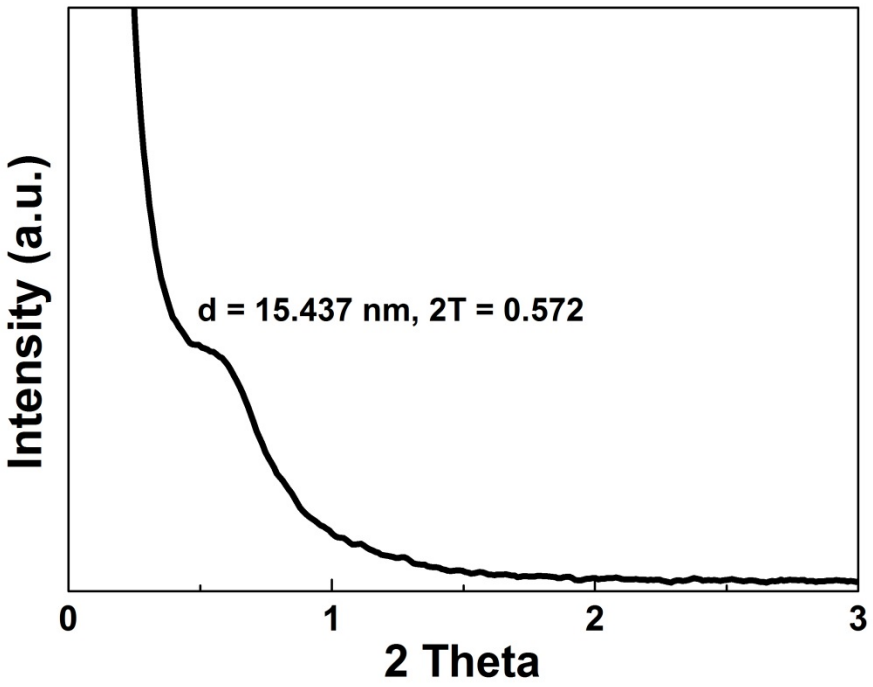

Figure S1. Small angle X-ray scattering (SAXS) patterns for graphene–2D mesoporous TiO_2. The shoulder peak appeared at 0.572° in accordance with TEM images. The TiO_2 mesoporous structure has an 8 nm wide pore and a 3 nm thick wall.

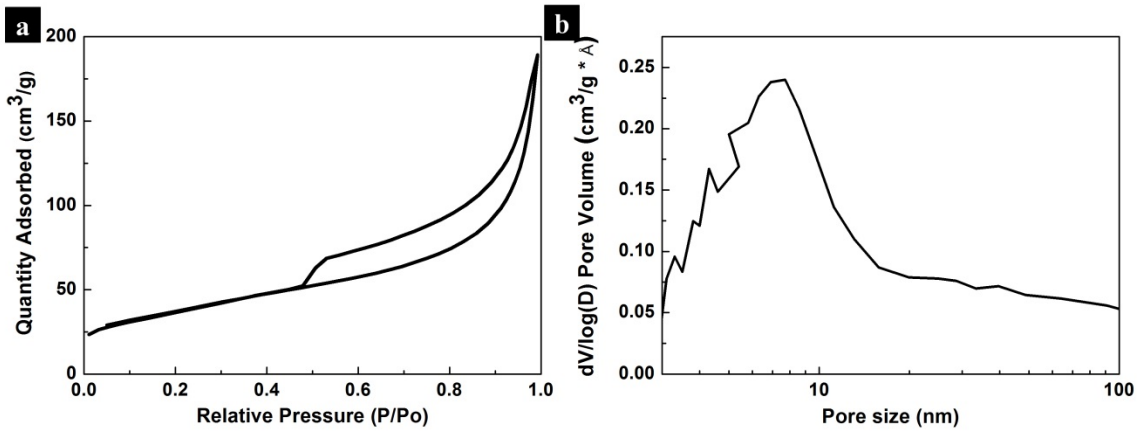

Figure S2. a) The N_2 adsorption isothermal plot at 77 K for graphene–2D mesoporous TiO_2 . b) Pore size distribution of graphene–2D mesoporous TiO_2 from BJH adsorption. The specific surface area is 130.5 m^2/g and the pore size is ~8 nm.

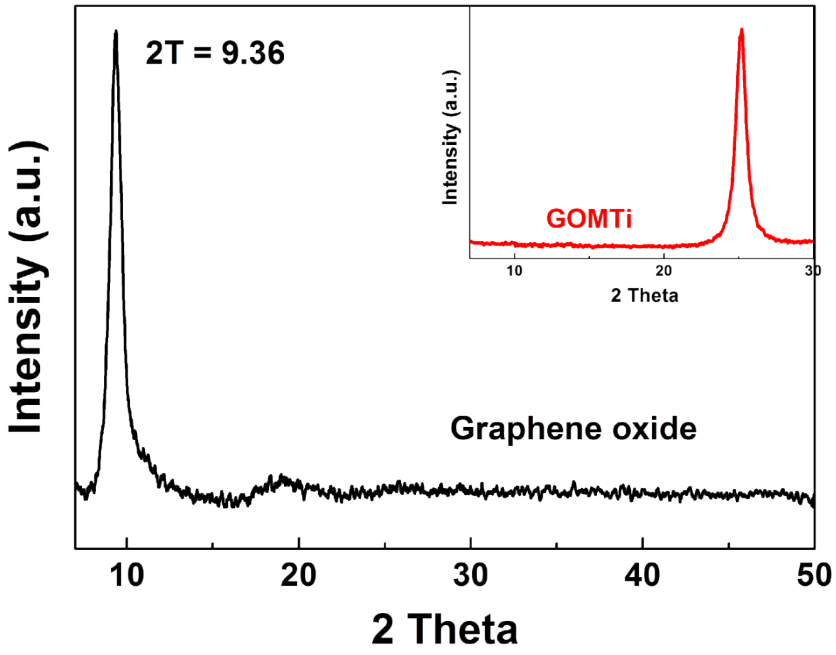

Figure S3. The XRD pattern of graphene oxide produced by the modified Hummer's method shows a sharp peak at 9.36°. The inset image is the magnified XRD pattern of GOMTi after calcination which disappear the peak of graphene oxide.

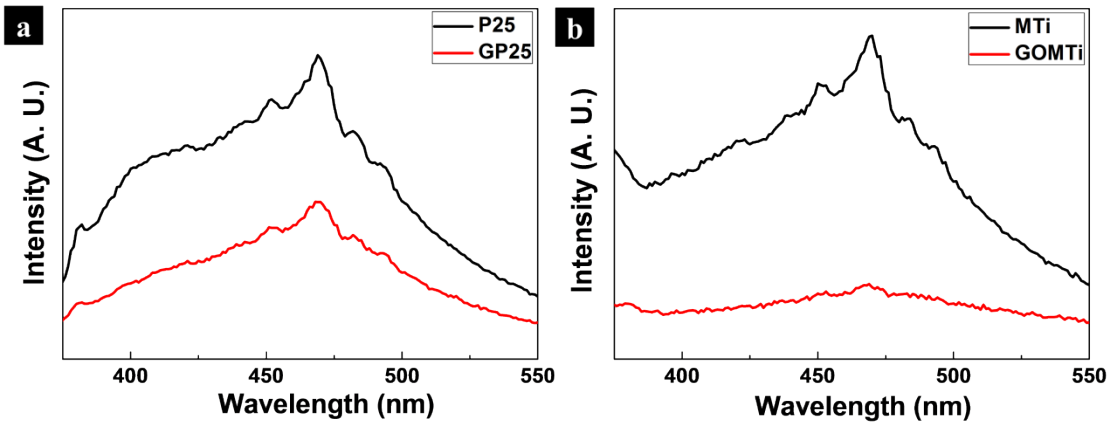

Figure S4. a) The photoluminescence spectra of conventional TiO_2 nanoparticles (P25, black) and graphene–P25 (red). b) The photoluminescence spectra of mesoporous TiO_2(MTi, black) and graphene–2D mesoporous TiO_2 (red). The photoluminescence of graphene–2D mesoporous TiO_2 was significantly lower than that of MTi. This comes from the fast charge separation of electrons with the help of reduced graphene oxide. Also, the charge separation in catalyst by incorporation of graphene significantly enhanced compared to graphene-P25 composite.

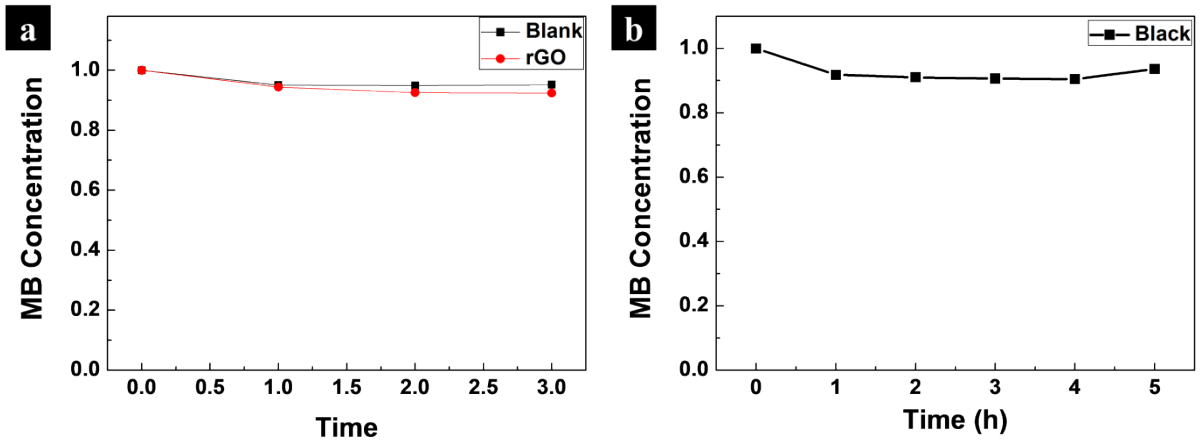

Figure S5. a) Photodegradation of methylene blue (MB) under visible light in reduced graphene oxide (rGO, red) and without catalyst (black) and b) photodegradation of methylene blue (MB) without visible-light.

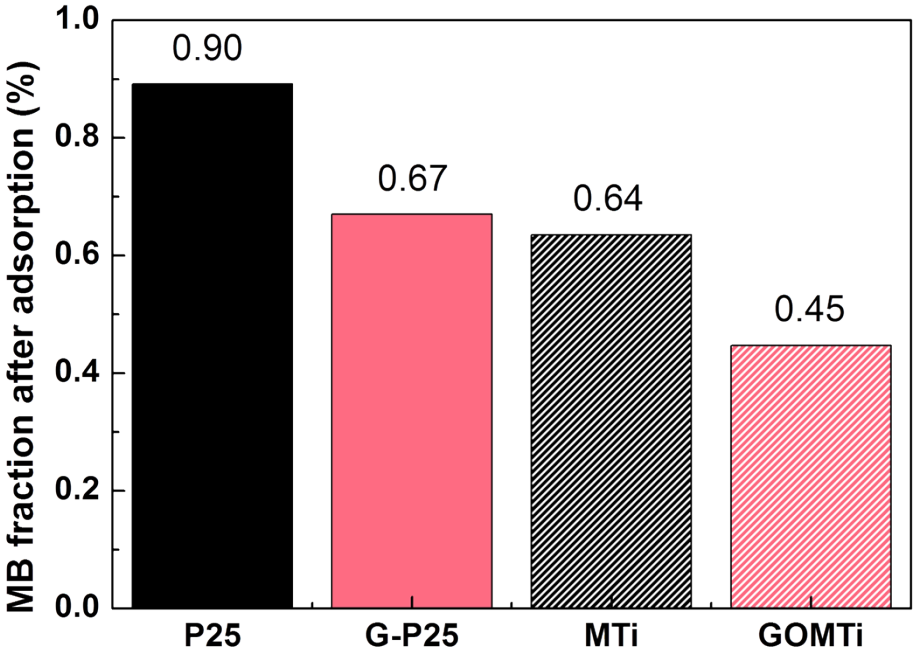

Figure S6. The remained methylene blue (MB) after full adsorption on P25, graphene/P25, mesoporous TiO_2 and graphene/2D mesoporous TiO_2. The GOMTi adsorb the many methylene blue, corresponding the large reactive surface area.