Fig. S1. TEM images of GO and TBT-4: (a) GO, (b) TiO$_2$ precursor@GO, (c) partial enlarged detail of TiO$_2$ precursor@GO, (d) TiO$_2$ nanosheets after removal of the GO.

Fig. S2. XRD pattern of TiO$_2$ precursor@GO.
The decrease of rutile phase in mix-phase TiO$_2$ with decreased TBT dosage was explained as below. In our work, GO amount was precisely controlled to 1g in all experiments. The simultaneous thermal gravimetric analysis (STA) of TiO$_2$ precursor@GO sheets in air was provided in the supporting information. The corresponding differential thermal calorimetry (DSC) curve (Fig. S5) displays two
distinct exothermic peaks at 223 °C and 475 °C, which were attributed to
dehydroxylation and oxidation of GO in TiO2 precursor@GO, respectively.
Especially, the thermal of strong exothermic at around 475 °C was very likely to form
rutile TiO2. Considering that 1g GO was used in all experiments, the amount of
formed rutile TiO2 was limited. As a result, simply changing the amount of Ti source
could manipulate the phase composition. Thus, rutile phase in mix-phase TiO2
decreased with the decreased TBT dosage.

Fig. S5. Simultaneous thermal gravimetric analysis (STA) of TiO2 precursor@GO
sheets in air.