# SUPPORTING INFORMATION

**Text 1. Detailed parameters of Raman test.**

Raman spectra were recorded using a confocal micro-Raman system (XploRA Plus, HORIBA) equipped with a 50× long-distance objective. The sizes of the slit and pinhole were 100 μm and 300 μm, respectively. All experiments were carried out at an excitation line of 638 nm from an internal laser. The laser power and integration time were set in 1.41 mW and 5 sec separately.

**Text 2. Detailed parameters of HPLC for TC.**

HPLC experiments were performed on a HPLC system (UltiMate 3000, Thermo Scientific) equipped with quaternary pump, autosampler, column thermostat, diode array detector (DAD) and Hypersil GOLD C18 column (5 μm, 4.6 mm × 250 mm). Prior to the analysis of HPLC, the samples were filtrated by ultrafiltrate membrane (0.22 μm). The parameters for catalytic solution were set as follows: column temperature was 30°C and the sample injection volume was 50 μL. The mobile phase, which was consisted of phosphoric acid (0.1%) and acetonitrile (with a volume ratio of 70:30, v/v), was set to 0.7 mL/min.

**Text 3. Detailed operation of recyclable experiments.**

BiTO/Ag, which has undergone a catalytic reaction, was collected and washed with ultrapure water for several times and dried at 60 ℃ for 8 h. For the second catalytic experiment, 0.1 g the aforementioned catalyst was used for the TC degradation. When the reaction ended, collect and clean the catalyst accordingly. Considering the losses during washing, the second catalytic

experiment was conducted multiple times to ensure sufficient amounts of catalyst for the third catalytic reaction. Then, measure 0.1 g of the “twice-used” catalyst and proceed with the aforementioned procedure to finish the third catalytic experiment. Similarly, the third catalytic reaction also needs to be carried out multiple times. The fourth and fifth catalytic experiments follow the same protocol as described above.

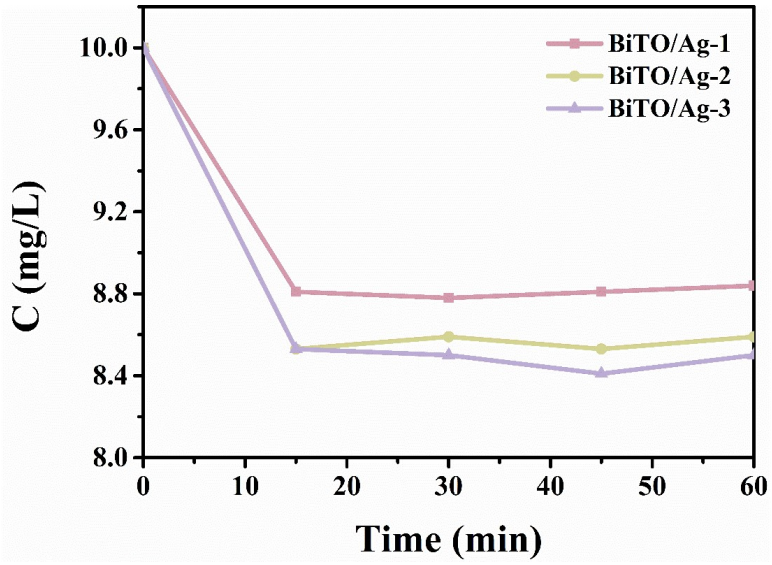


**Fig. S1** The adsorption performance of BiTO/Ag within 60 min.

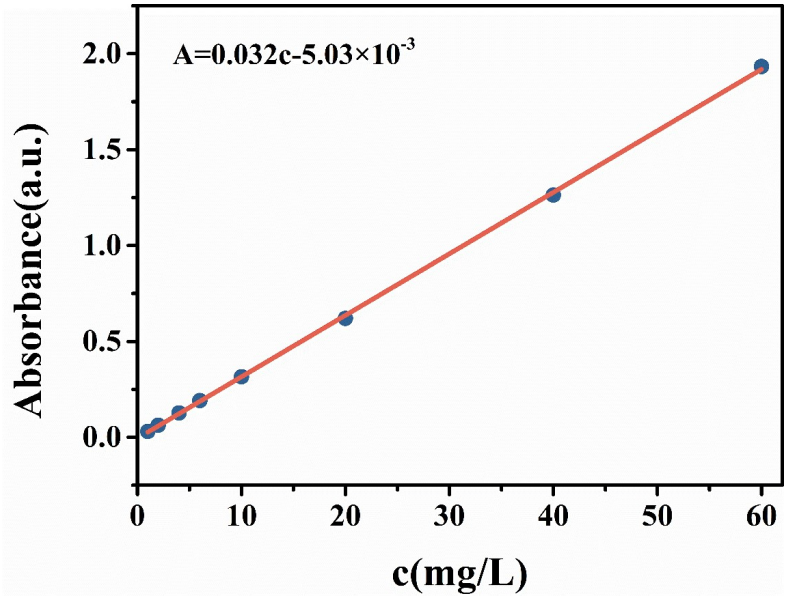


**Fig. S2** Concentration-absorbance standard curve of TC.

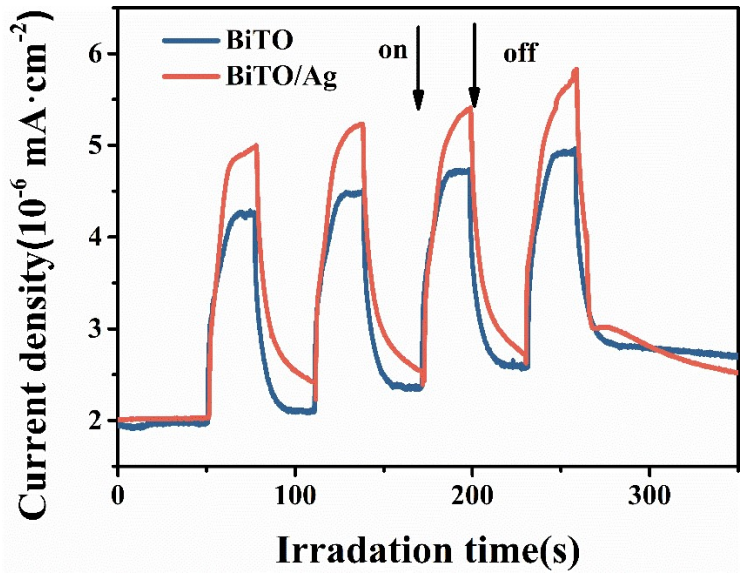


**Fig. S3** Transient photocurrent response (TPR) curves of BiTO and BiTO/Ag.

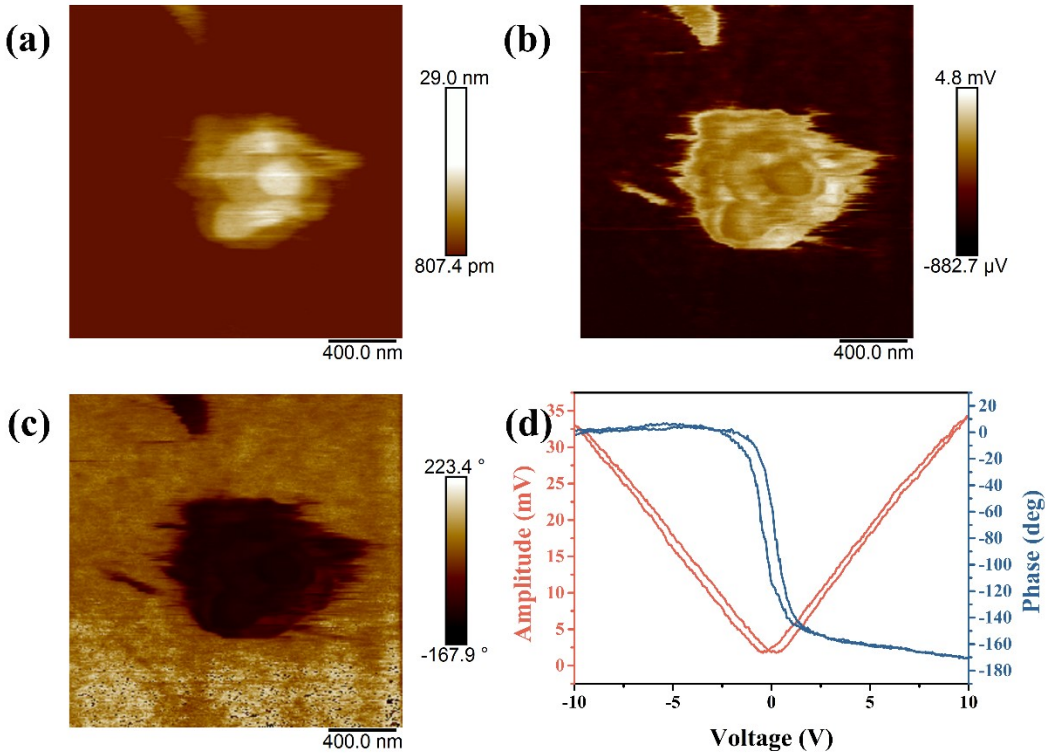


**Fig. S4** The (a) topography, (b) amplitude, (c) phase images, (d) amplitude-/phase-voltage curves of BiTO/Ag.

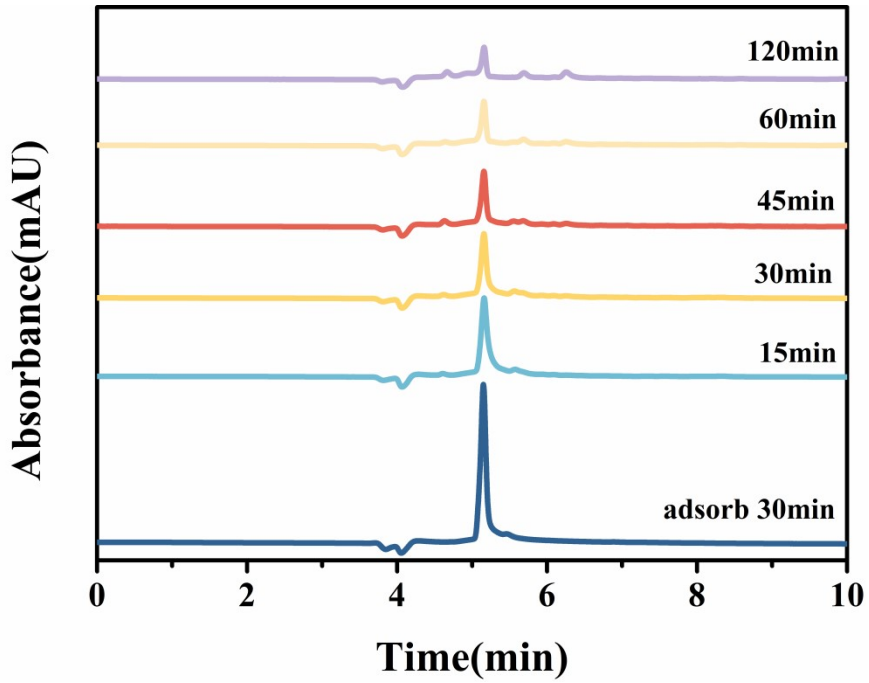


**Fig. S5** Chromatograms at different reaction times during TC degradation.