

Supporting Information

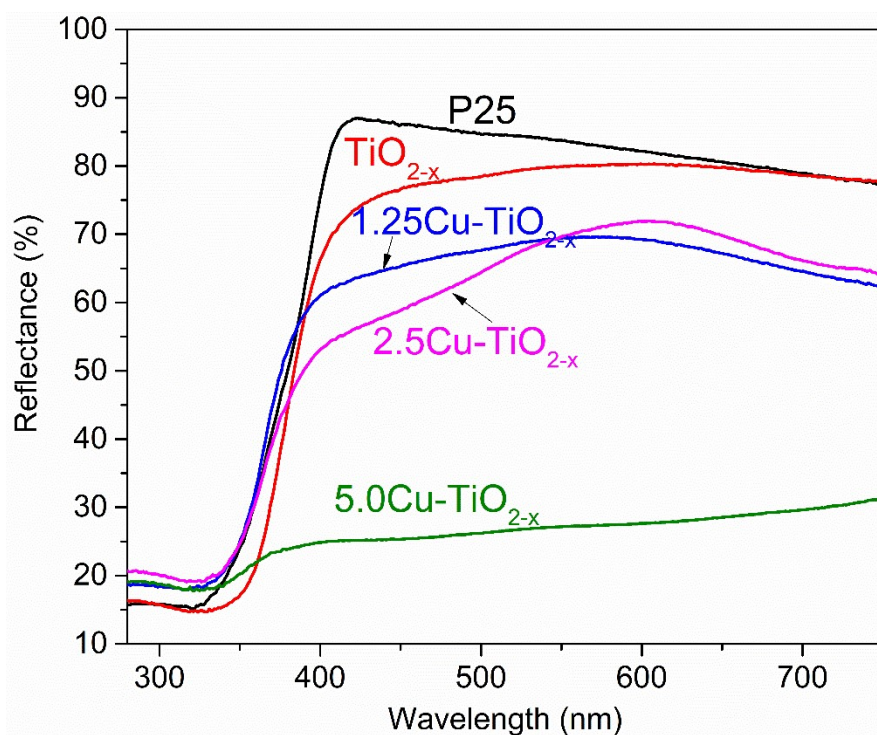


Fig. S1. Diffused reflectance of the fabricated samples and P25.

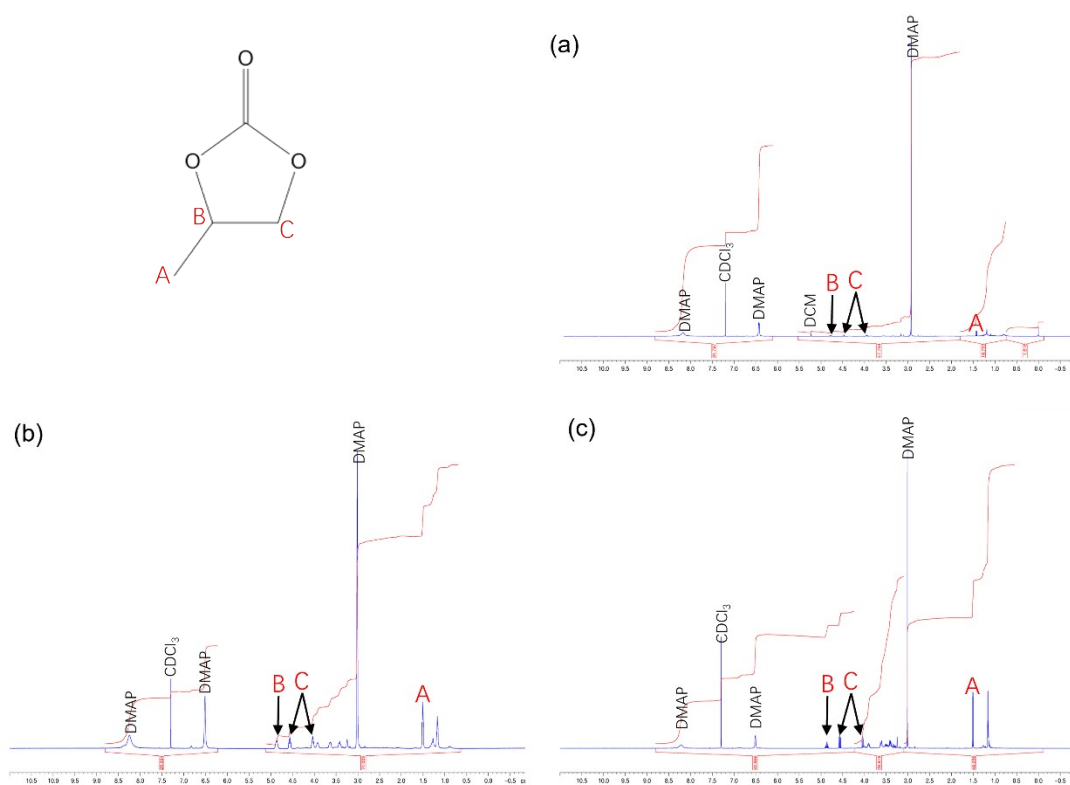


Fig. S2. ¹H NMR pattern of the product obtained after the photocatalytic reaction using TC-12.5

(a), TC-25 (b), and TC-50 (c).

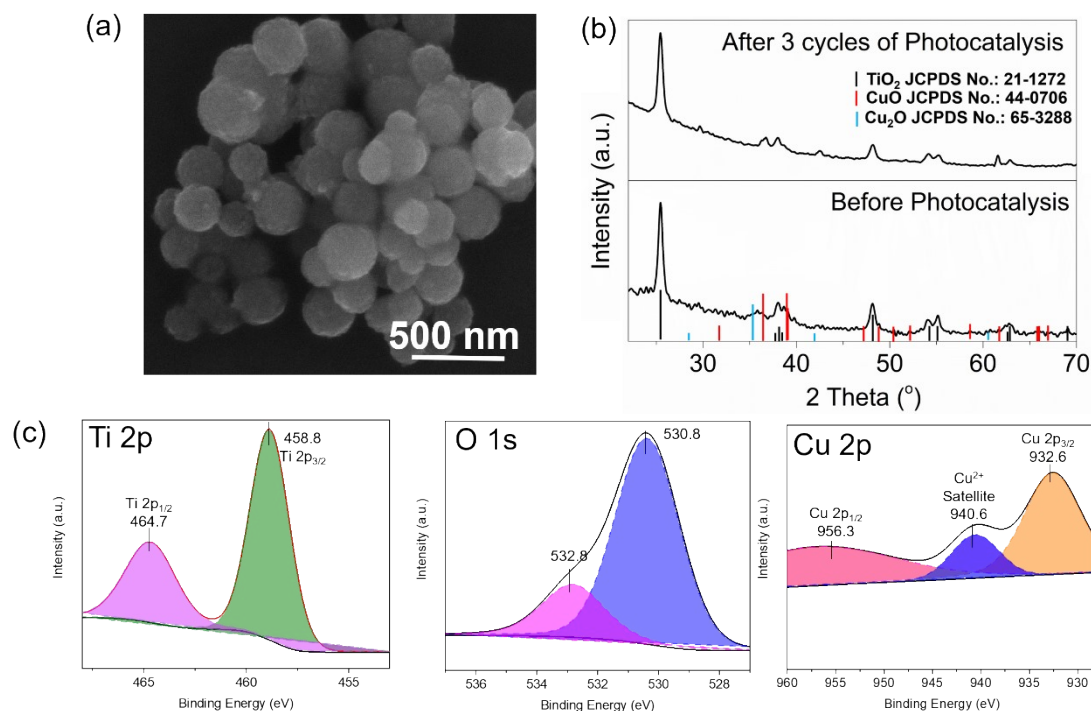


Fig. S3. SEM, XRD and XPS of TC-25 after 3 cycles of photocatalytic production PC.

The recycling test of the optimised sample TC-25 revealed 100% selectivity with ~5% decrement in the production of PC after 3 cycles (~1.5 wt%) compared to the TC-25 after 1 cycle (Table 1). The deterioration in production was very likely due to the loss of catalyst during catalyst recovery process. The crystallinity and crystal phase of TC-25 before and after 3 cycles of photocatalysis revealed slight changes, in which the crystallinity of Cu₂O increased whereas CuO phase disappeared after 3 cycles. The change observed was probably attributed to the reduction of CuO into Cu₂O moiety under pressurized system in the presence of propylene oxide, which was converted into propylene carbonate.¹ The oxidation state of Ti 2p after 3 cycles of photocatalysis did not show significantly change. However, the satellite peak of Cu²⁺ was shifted to lower binding energy (940.6 eV) compared to fresh TC-25 sample (942.1 eV, Figure 3C-c), indicating the chemical shift to lower oxidation state. This observation again evidenced the CuO moiety was being reduced after the photocatalysis in propylene oxide.

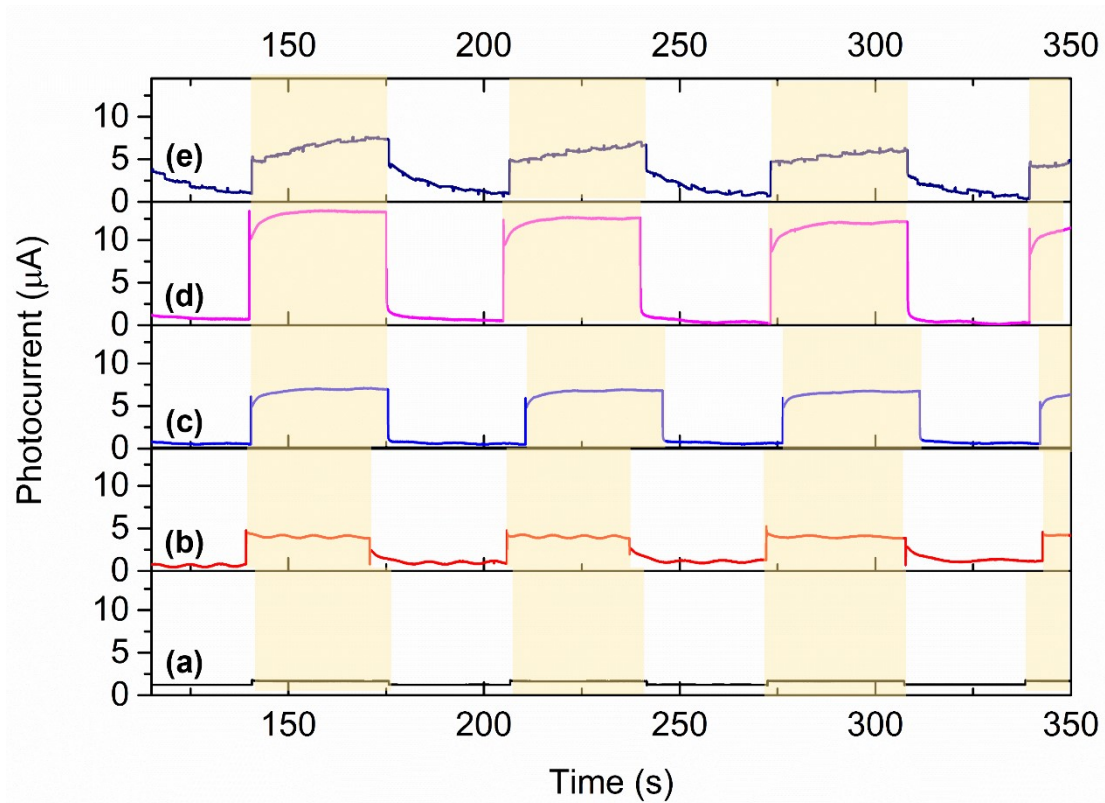


Fig. S4. Chronoamperometric measurement of P25 (a), TiO_{2-x} (b), TC-12.5 (c), TC-25 (d), and TC-50 (e).

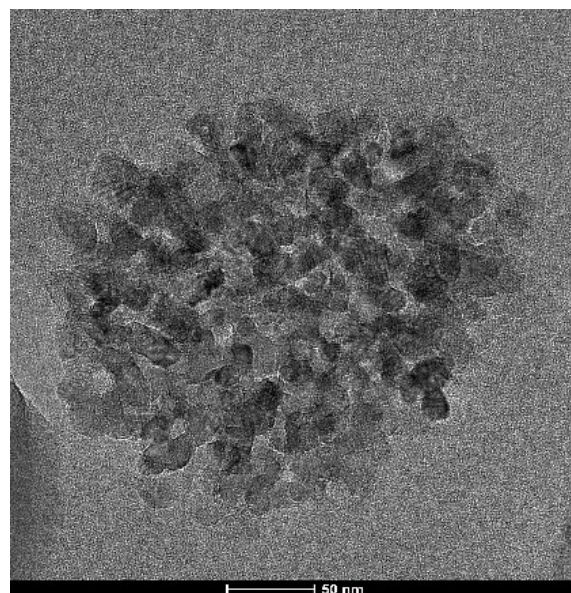


Fig. S5. TEM image of TiO_{2-x} .

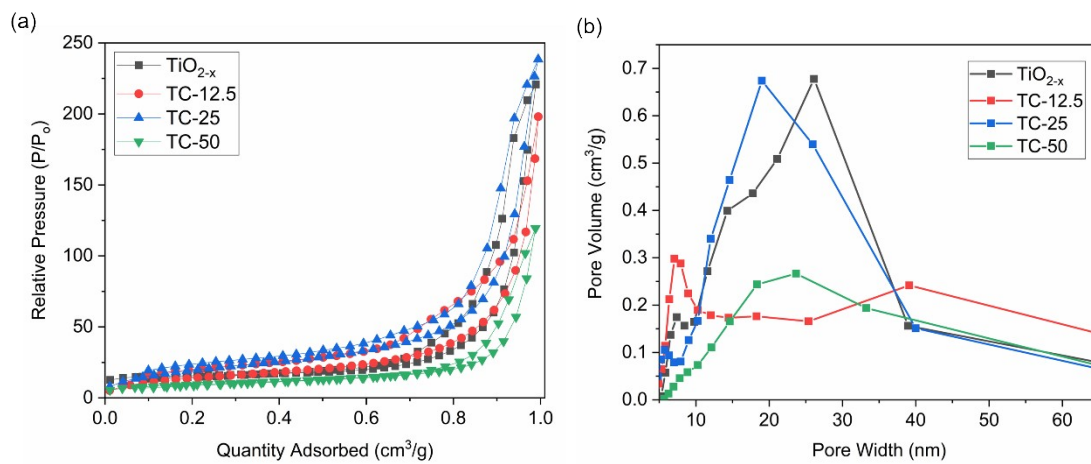


Fig. S6. Isotherm and pore size distribution of the fabricated samples.

Reference

1. J. B. Reitz and E. I. Solomon, *J. Am. Chem. Soc.*, 1998, **120**, 11467-11478.