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Supporting Information

Ti(IV) nanocluster as a promoter on semiconductor photocatalysts for oxidation of organic compounds

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Table S1. Performances of the photocatalysts under 1mW/cm^2 blue light irradiation

Sample	Cu(II)-Ti(IV)-WO_3	Cu(II)-WO_3
Rp[a](quanta/sec)	3.91×10^{15}	3.91×10^{15}
Rco_2(μmol/h)	0.83	0.47
QE(%)	21.2	12.0

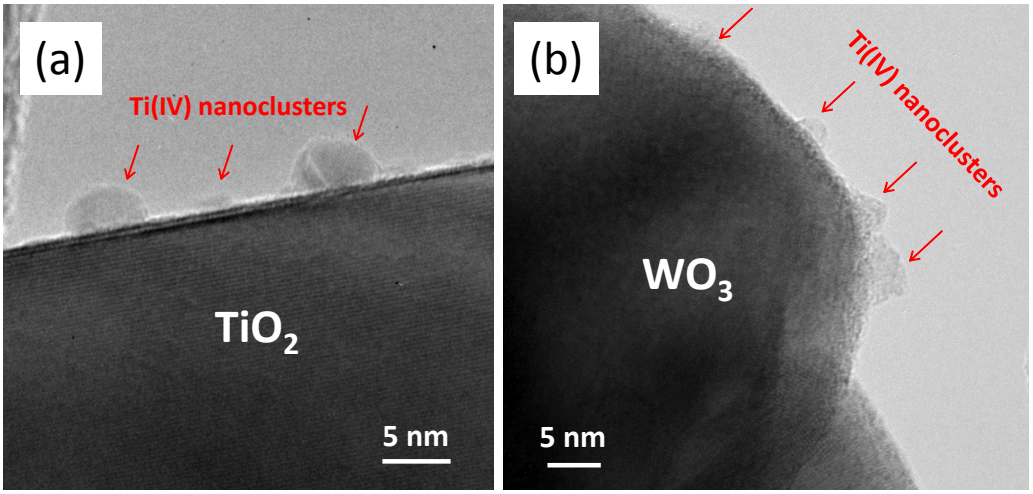

Fig. S1 High Resolution TEM images for Ti(IV)-TiO_2 (a) and Ti(IV)-WO_3 (b).

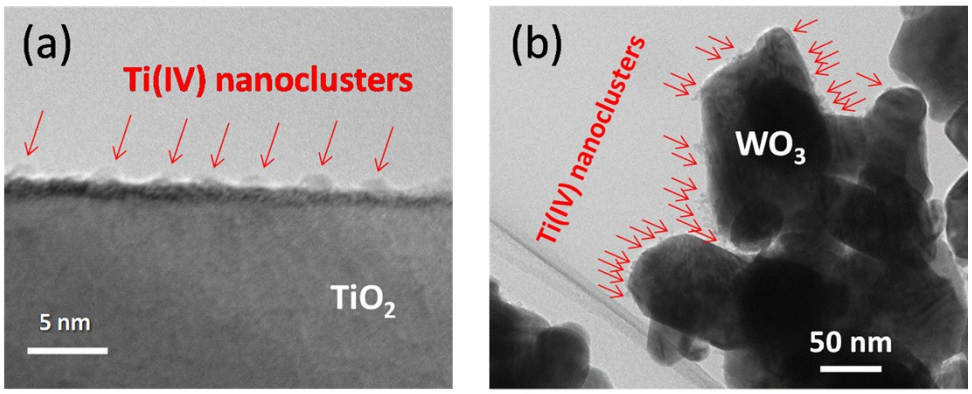

Fig. S2 TEM images for Ti(IV)-TiO_2 (a) and Ti(IV)-WO_3 (b).

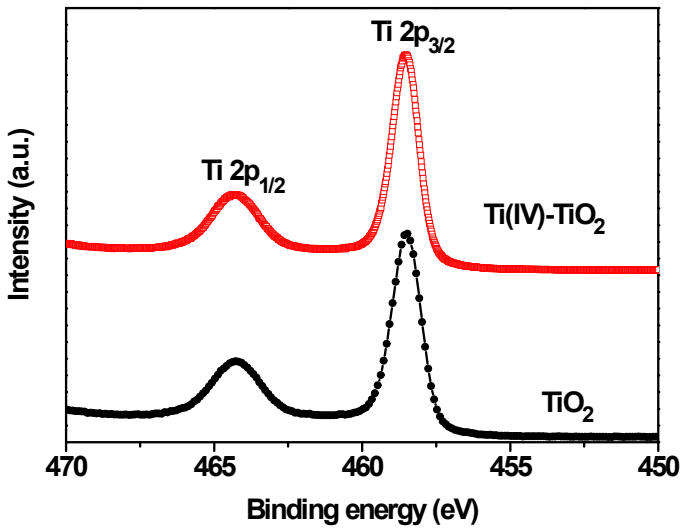

Fig. S3 XPS on Ti 2p core-level of TiO_2 and Ti(IV)-TiO_2, respectively.

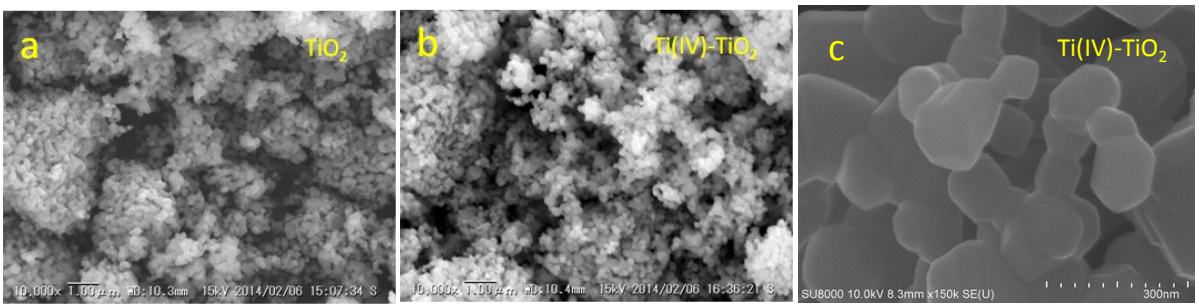

Fig. S4 SEM images of rutile TiO_2 (a) and Ti(IV)-TiO_2 (b). High resolution FE-SEM image of Ti(IV)-TiO_2 (c).

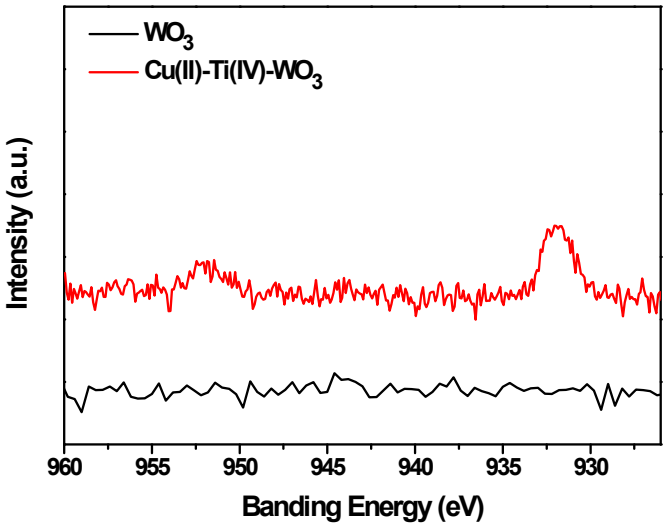

Fig. S5 XPS on Cu 2p core-level of WO_3 and Cu(II)-Ti(IV)-WO_3.

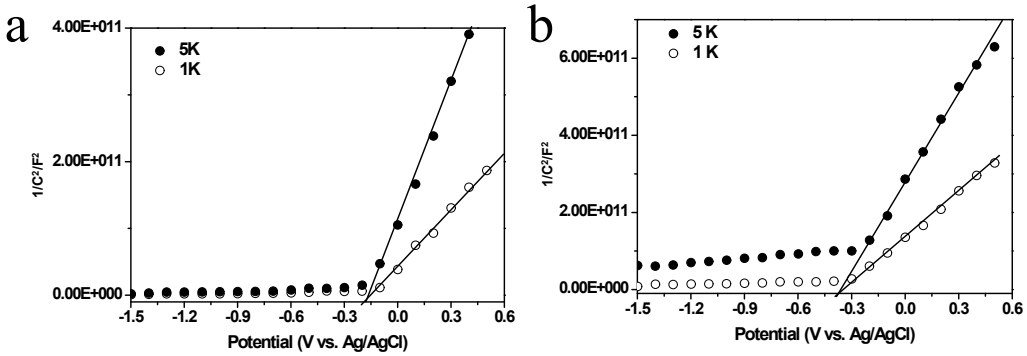

Fig. S6 Mott–Schottky plots of WO_3 (a) and Ti(IV)-WO_3 (b) at frequencies of 1 k Hz and 5 k Hz, respectively.

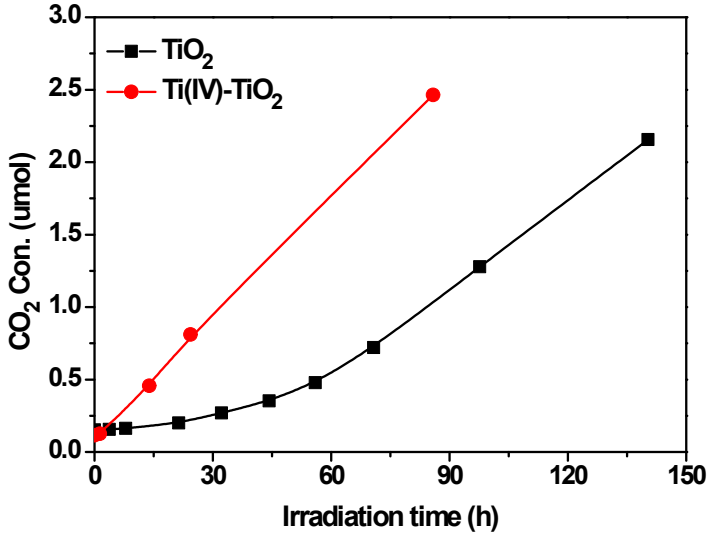

Fig. S7 Photocatalytic oxidation of 2-propanol on TiO_2 and Ti(IV)-TiO_2 under UV light irradiation.

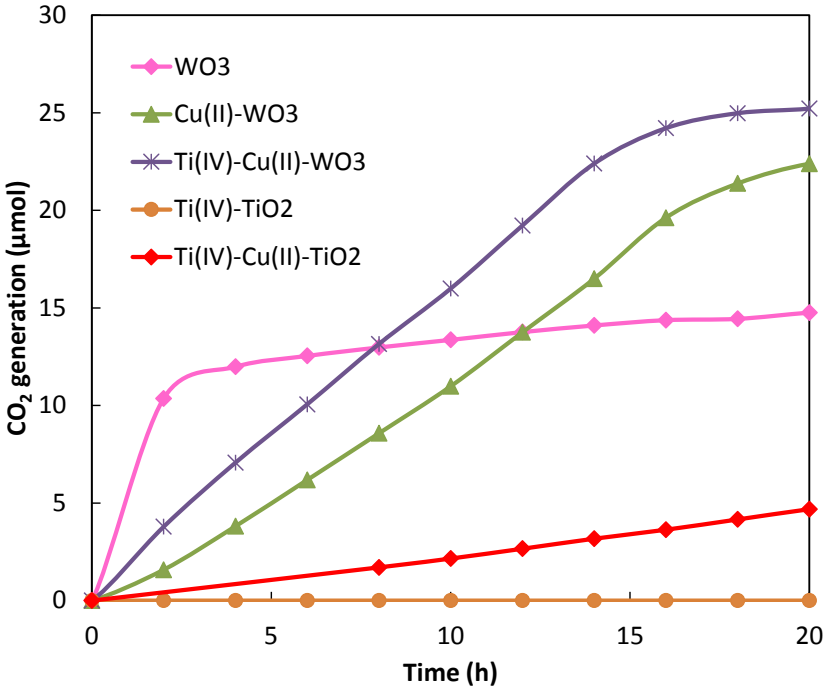

Fig. S8 Photocatalytic oxidation of acetaldehyde under a commercial white LED irradiation.

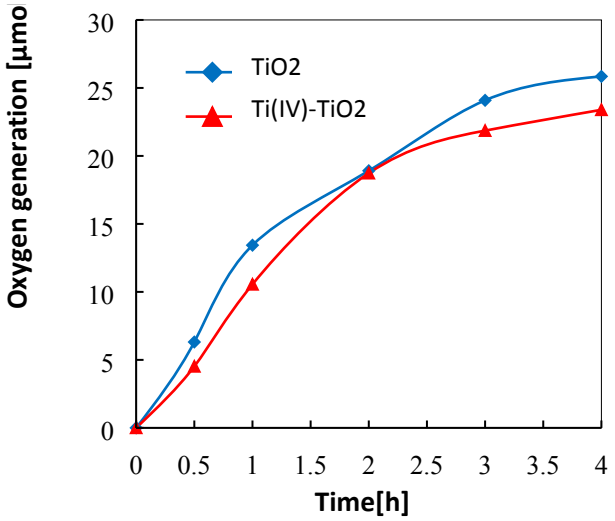

Fig. S9 Photocatalytic activities of TiO_2 and Ti(IV)-TiO_2 for water oxidation in aqueous solution containing sacrificial $AgNO_3$ agent (50 mmol/L). Light source was Hg-Xe lamp.

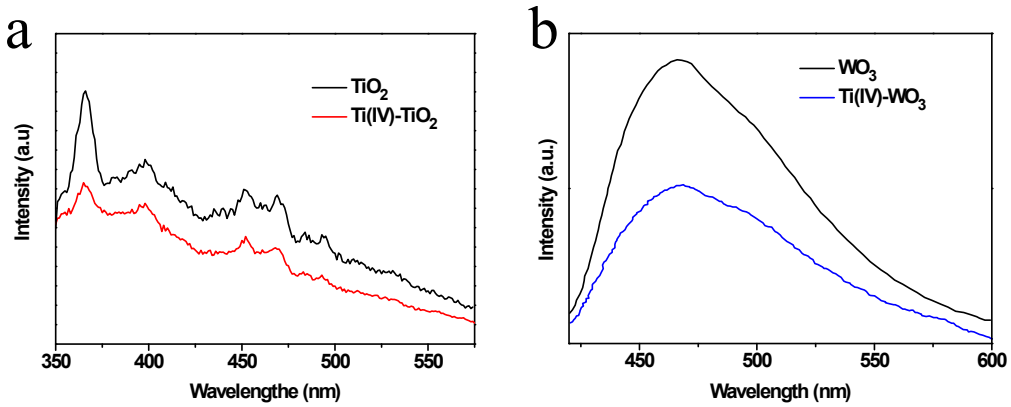

Fig. S10 Photoluminescence spectra for TiO_2 and WO_3 samples

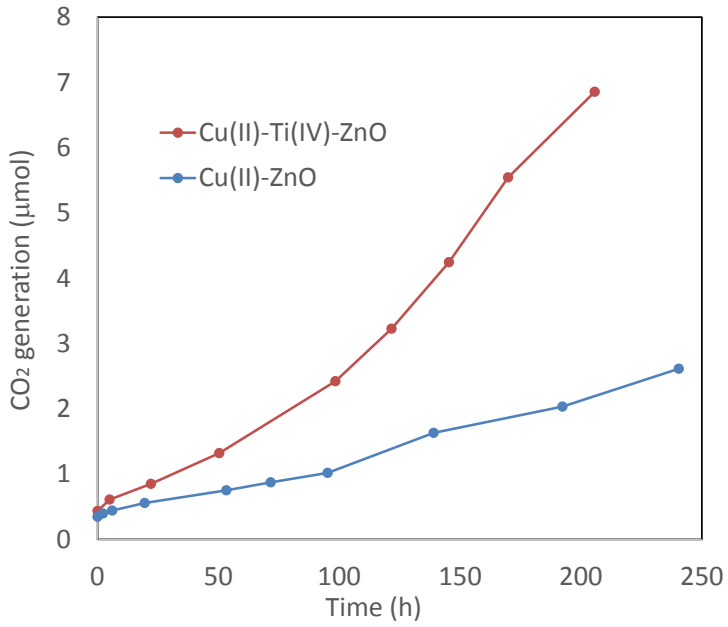

Fig. S11 Photocatalytic activities for oxidation of 2-propanol for Cu(II)-Ti(IV)-ZnO and Cu(II)-ZnO under blue light irradiation.

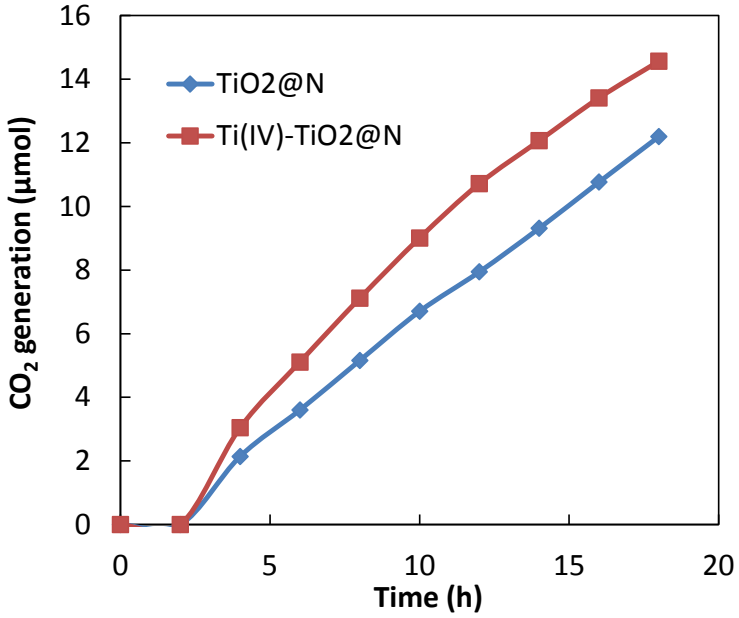

Fig. S12 Photocatalytic activities for oxidation of acetaldehyde for nitrogen doped TiO_2 (TiO_2@N) and Ti(IV) nanoclusters grafted nitrogen doped TiO_2 (Ti(IV)-TiO_2@N) under white LED irradiation.