Visible light-driven decomposition of gaseous benzene on robust Sn$^{2+}$-doped anatase TiO$_2$ nanoparticles

Huaqiang Zhuang, Quan Gu, Jinlin Long*, Huan Lin, Huaxiang Lin, Xuxu Wang*

Research Institute of Photocatalysis, State Key Laboratory of Photocatalysis on Energy and Environment, College of Chemistry, Fuzhou University, Fuzhou 350116, People’s Republic of China

E-mail: jllong@fzu.edu.cn; xwang@fzu.edu.cn

Web: chem.fzu.edu.cn/szdw/teacherinfo.aspx?id=40

Tel: +86-591-83779121; Fax: +86-591-83779121
To verify the structure of Sn-incorporated TiO$_2$, the TS-x samples were further characterized by the Raman technology, as shown in Figure S1. There are one strong Raman peak at 149.7 cm$^{-1}$ and four weak peaks at 194, 395, 516 and 638 cm$^{-1}$ are assigned to $\text{E}_g$, $\text{E}_g$, $\text{B}_{1g}$, $\text{A}_{1g}$, and $\text{E}_g$, respectively, which are consistent with anatase structure TiO$_2$.\cite{1,2} From the Raman spectra of the TS-x samples, the main Raman peaks at 113 cm$^{-1}$ and 211 cm$^{-1}$ attributed to SnO crystalline form can’t be detected, which indicates there don’t exist a separate SnO crystalline phase in the Sn-doped TiO$_2$ system.\cite{3} The result is in good agreement with the result from the XRD pattern of the TS-x samples.
Figure S2 Nitrogen adsorption-desorption isotherms of the pure TiO$_2$ and TS-40 samples. The insert shows the corresponding Barret-Joyner-Halenda (BJH) pore size distributions.
Figure S3 Cycle runs for the photooxidation of benzene on TS-20 sample: (A) the conversion of benzene; (B) The yield of produced CO$_2$. 
Figure S4 Sn K-edge EXAFS fit results for the SnO, SnO$_2$, TS-5, TS-40 and TS-60 samples.
Figure S5 Mott-Schottky plots of the pure TiO$_2$ and TS-60 material.
Figure S6 ESR signal of the DMPO-•O₂ spin adducts for TS-40 sample without irradiation and with visible light irradiation.

