Visible light-driven decomposition of gaseous benzene on robust Sn^{2+}-doped anatase TiO_2 nanoparticles

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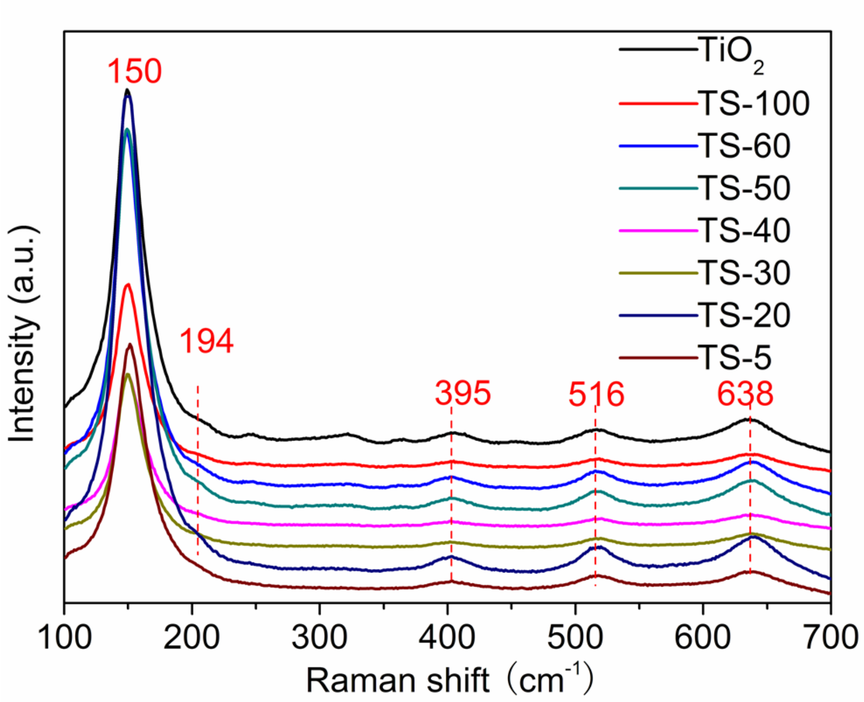


Figure S1 The Raman spectrum of the obtained TS-x samples and pure TiO_2.

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 149.7cm^{-1} and four weak peaks at 194, 395, 516 and 638 cm^{-1} are assigned to Eg, Eg, B1g, A1g, and Eg, respectively, which are consistent with anatase structure TiO_2. [1, 2] From the Raman spectra of the TS-x samples, the main Raman peaks at 113cm^{-1} and 211cm^{-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. [3] The result is in good agreement with the result from the XRD pattern of the TS-x samples.

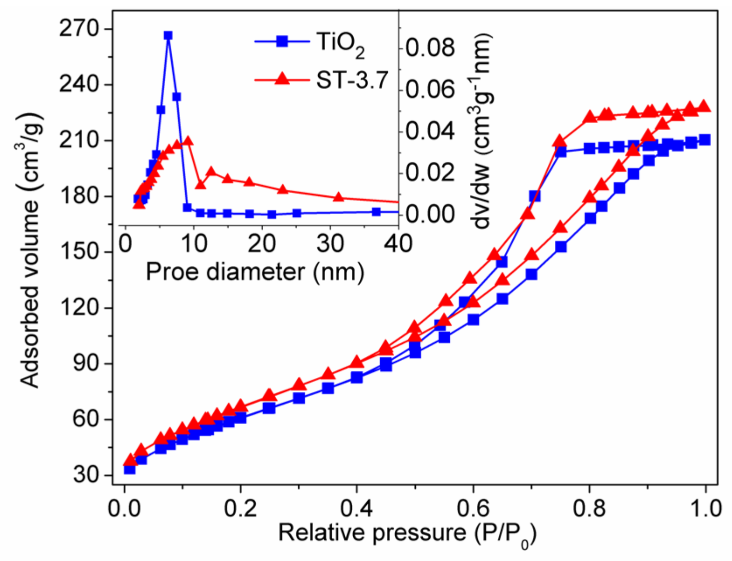


Figure S2 Nitrogen adsorption-desorption isotherms of the pure TiO_2 and TS-40 samples. The Insert shows the corresponding Barret-Joyner-Halenda (BJH) pore size distributions.

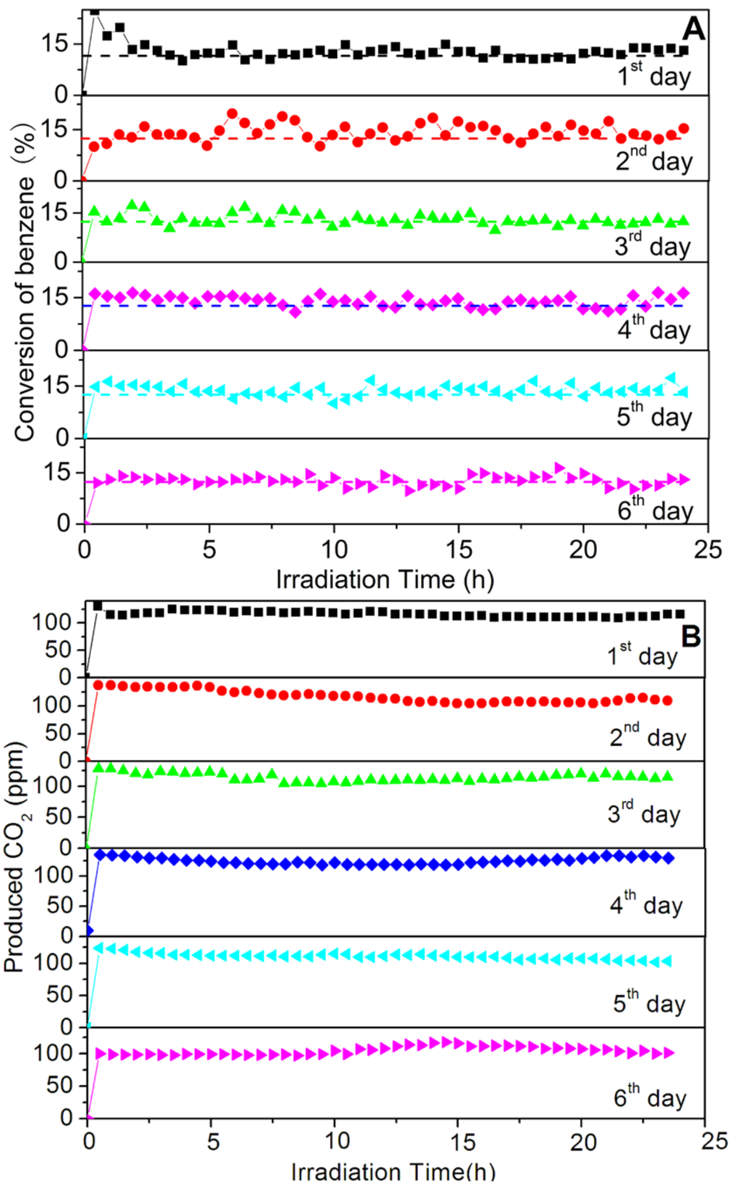
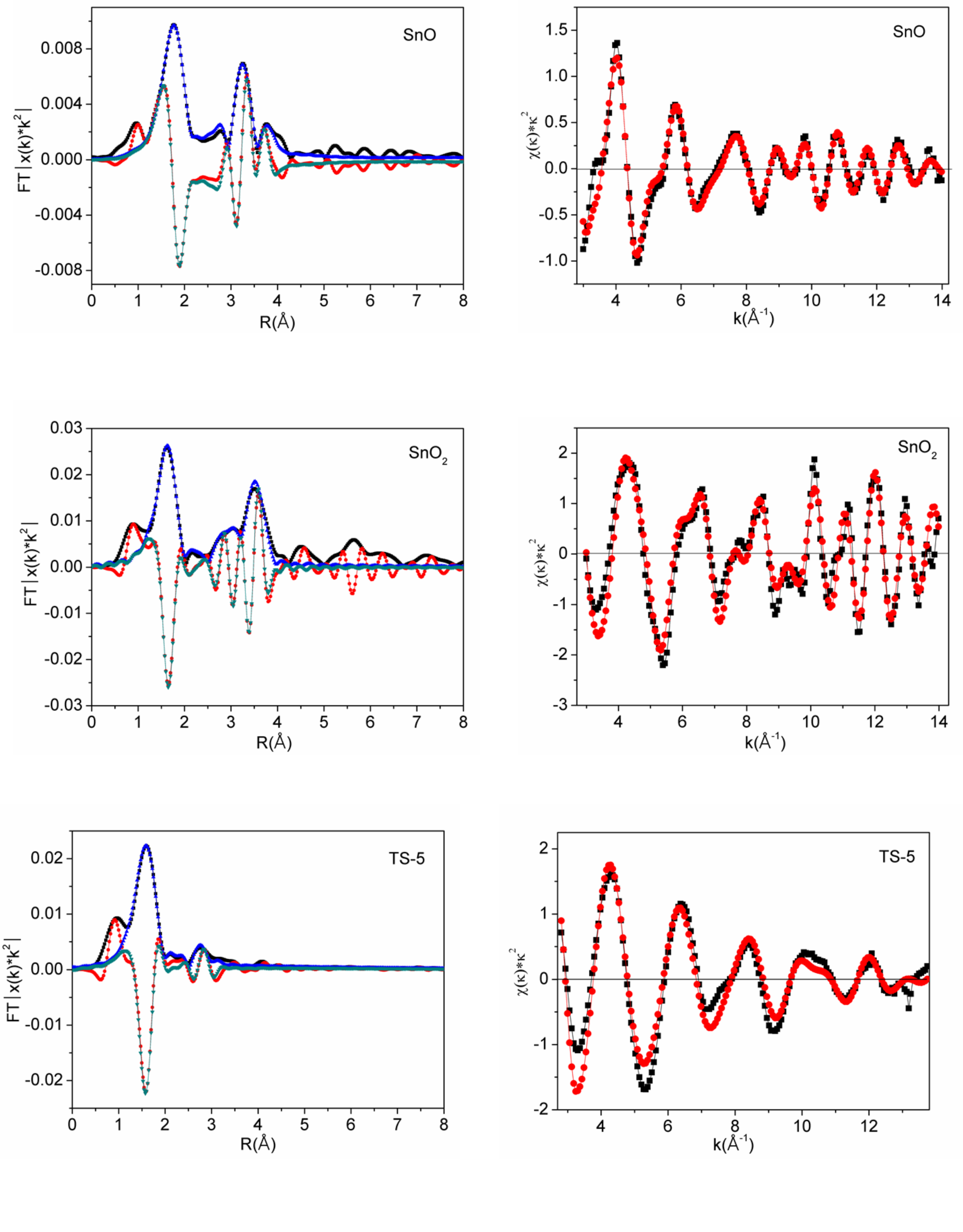


Figure S3 Cycle runs for the photooxidation of benzene on TS-20 sample: (A) the conversion of benzene；(B) The yield of produced CO_2.


SnO
FT|x(k)*k^2|
R(Å)
χ(κ)*κ^2
k(Å^{-1})
SnO$_2$
TS-5

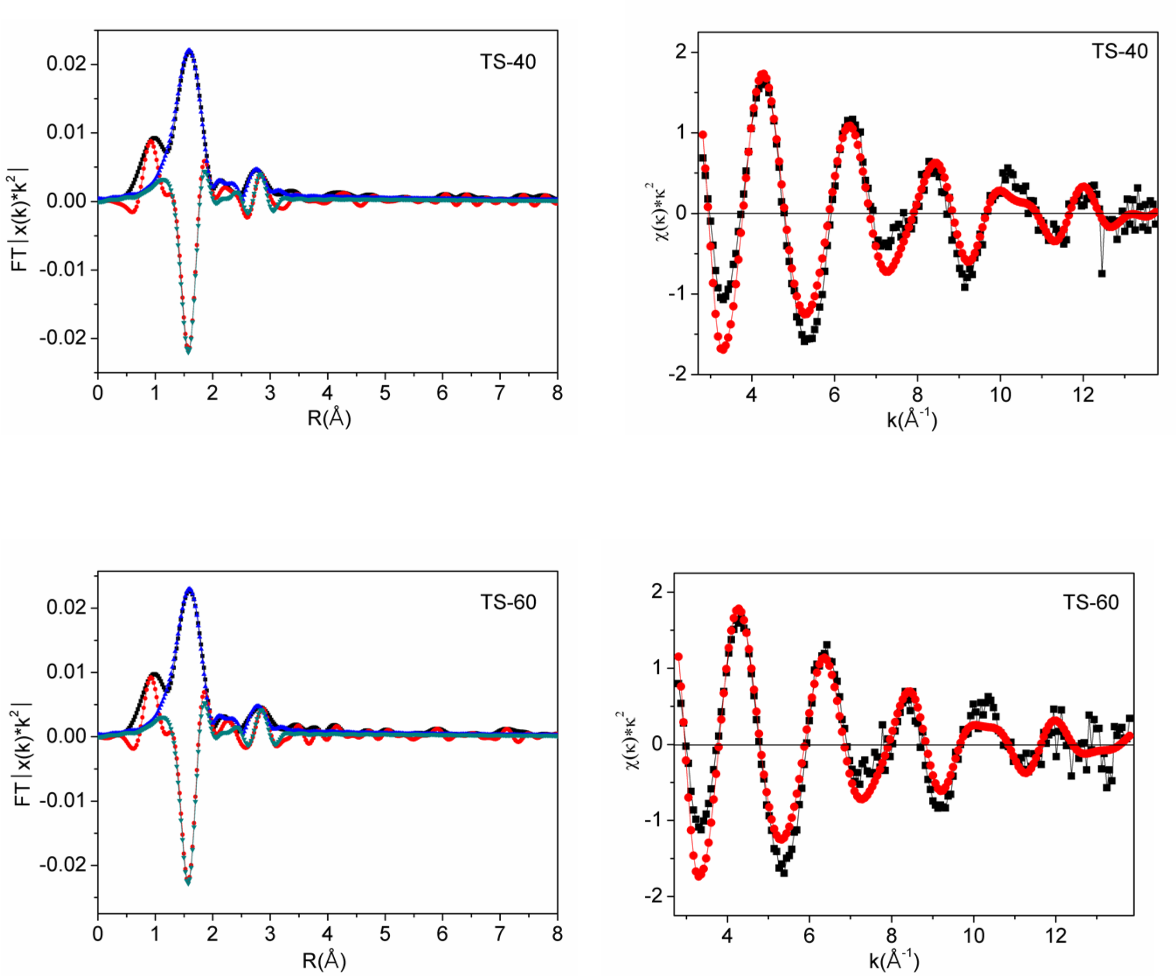


Figure S4 Sn K-edge EXAFS fit results for the SnO, SnO_2, TS-5, TS-40 and TS-60 samples.

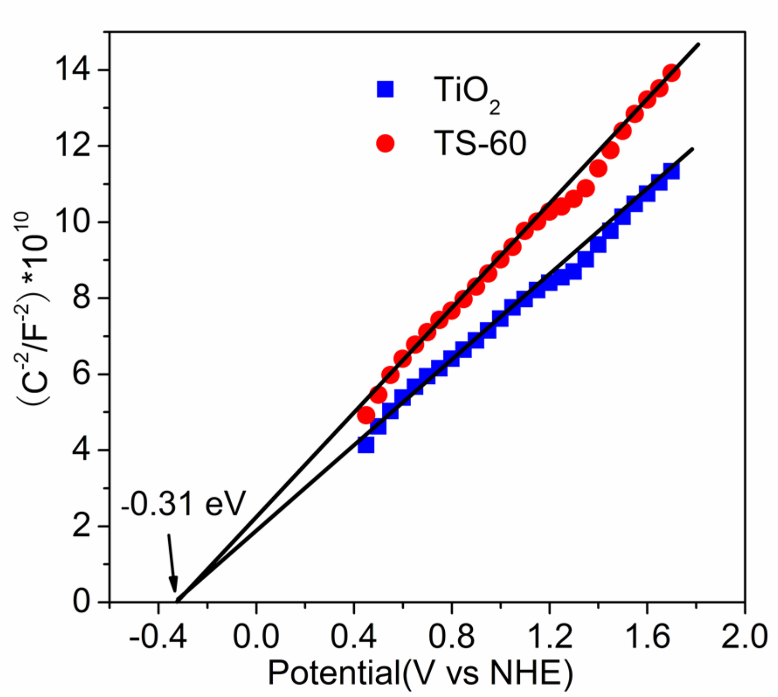


Figure S5 Mott-Schottky plots of the pure TiO_2 and TS-60 material.

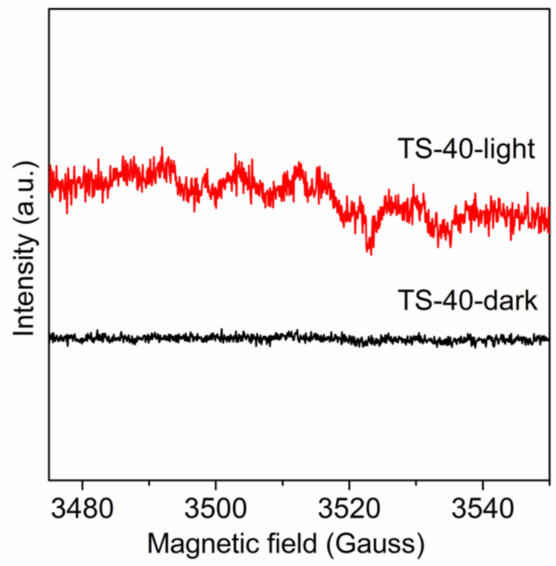


Figure S6 ESR signal of the DMPO-$^{\bullet-}O_2$ spin adducts for TS-40 sample without irradiation and with visible light irradiation.

[1] W. Su, J. Zhang, Z. Feng, T. Chen, P. Ying, C. Li, J. Phys. Chem. C 112 (2008) 7710-7716.

[2] H.-F. Wang, L.-Y. Chen, W.-N. Su, J.-C. Chung, B.-J. Hwang, J. Phys. Chem. C 114 (2010) 3185-3189.

[3] Y. Zhao, J. Liu, L. Shi, S. Yuan, J. Fang, Z. Wang, M. Zhang, Appl. Catal. B: Environ. 103 (2011) 436-443.