Electronic Supplementary Information

C-S bonds induced ultrafine SnS_2 dots/ porous g-C_3N_4 sheets 0D/2D heterojunction: synthesis and photocatalytic mechanism investigation

Anquan Zhu [#], Lulu Qiao [#], Ziqi Jia, Pengfei Tan, Yi Liu, Yongjin Ma and Jun Pan*

State Key Laboratory for Powder Metallurgy, Central South University, Changsha 410083, P. R. China

[#] These authors contributed equally to this work.

*corresponding author. Tel: +86-0731-88836646
Email: jun.pan@csu.edu.cn (Jun Pan)

Materials and Reagents

Urea (AR, 99%) was obtained from Aladdin Industrial Corporation (Shanghai, China). L-Cysteine (99%) and Tin chloride pentahydrate (AR, 99%) were provided by Aladdin Industrial Corporation (Shanghai, China). Furthermore, ethanol (AR) and thioacetamide (AR) were purchased from Sinopharm Chemical Reagent Co., Ltd.

Photocatalysts characterization

The morphologies and structures of as-prepared materials were explored using a field emission scanning electron microscope (Nova Nano SEM 230, FEI Co., Ltd.) with an acceleration voltage of 10 KV and transmission electron microscopy (TEM, JEM-2100F JEOL Ltd. Japan) with an acceleration voltage of 200 KV. X-ray powder diffraction patterns were recorded on an X-ray diffractometer (XRD; D/max 2550, Rigaku Corporation) with Cu Kα radiation (λ=0.15405nm).The surface chemical states were analyzed by X-ray photoelectron spectroscopy (ESCALAB 250Xi, ThermoFisher-VG Scientific), and the binding energies of all elements were calibrated through the C 1s peak (BE = 284.8 eV) as standard. Brunauer-Emmertt-Teller (Quadrasorb SI-3MP) was tested at 77.3 K after degassed at 200 °C for 10 h. Fourier transform infrared spectra (FTIR) were measured on an infrared spectroscope (Nicolet 6700, Thermo Nicolet Corporation) in the range of 3800–400 cm^{-1}, using KBr pellets as reference. The UV-Vis spectra and photocatalytic performances of the catalysts were obtained on a UV-Vis spectrometer (Evolution 220, Thermo Fisher Scientific). The photoluminescence (PL) spectra were measured on a fluorescence spectrophotometer (F-4600, Japan's Hitachi LTD).

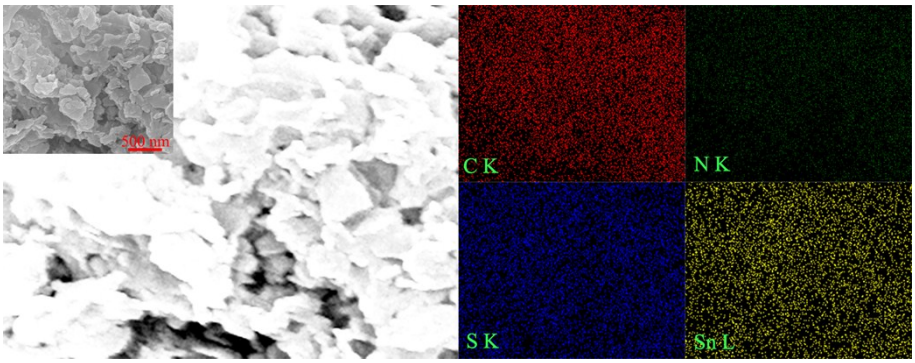

Fig. S1. SEM image of the SnS_2/g-C_3N_4 heterojunction and the corresponding elements mapping of C, N, S and Sn.

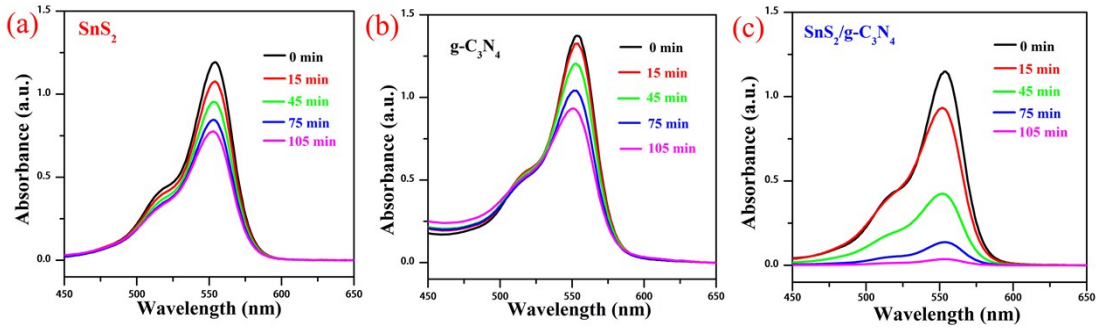

Fig. S2. The absorption spectral changes of RhB in the presence of pure SnS_2 (a), g-C_3N_4 (b) and SnS_2/g-C_3N_4 heterojunction (c).

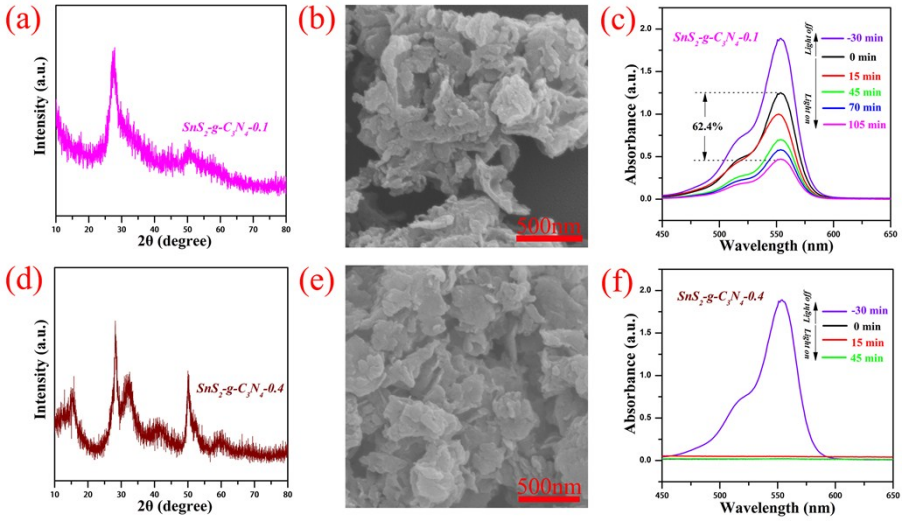

Fig S3 The XRD pattern (a), SEM image (b) and the absorption spectral changes of RhB (c) for the sample SnS_2-g-C_3N_4-0.1 (theoretical mass ratio: SnS_2/g-C_3N_4 = 0.1); the XRD pattern (a), SEM image (b) and the absorption spectral changes of RhB (c) for the sample SnS_2-g-C_3N_4-0.4.