

Supporting Information

**Ag@SrTiO₃ nanocomposite for super photocatalytic degradation of organic dye
and catalytic reduction of 4-nitrophenol**

Zhengcui Wu,* Yali Zhang, Xia Wang and Zexian Zou

Anhui Key Laboratory of Molecule-Based Materials, The Key Laboratory of Functional Molecular Solids,

Ministry of Education, College of Chemistry and Materials Science, Anhui Normal University, Wuhu

241000, P. R. China.

*Corresponding author. E-mail: zhengcui@mail.ahnu.edu.cn.

Tel.: +86 553 3869302; Fax: +86 553 3869302.

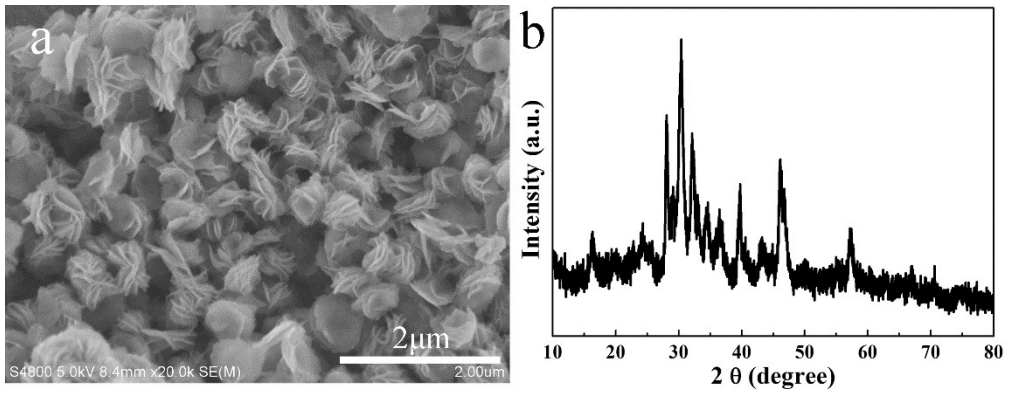


Fig. S1 The FESEM image (a) and XRD pattern (b) of the SrTiO₃ precursor.

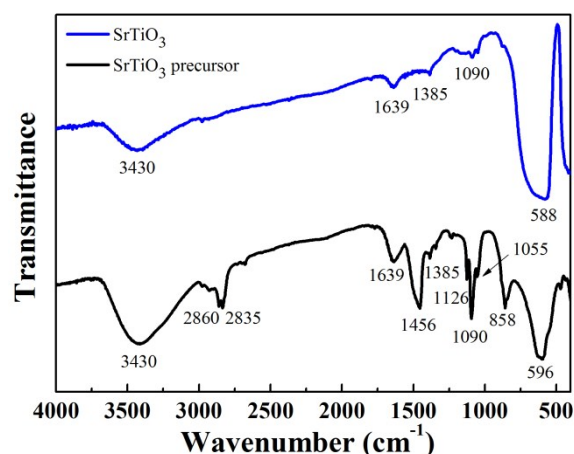


Fig. S2 FTIR spectra of the SrTiO₃ precursor and pristine SrTiO₃.

For the SrTiO₃ precursor, the broad absorption peak at 3430 cm⁻¹ and the band at 1639 cm⁻¹ are individually the stretching and bending vibrational mode of O — H bond, confirming the product absorbed a small amount of water molecules or bonded some hydroxyl groups. The absorption peaks observed at 2860 and 2835 cm⁻¹ were associated with the stretching vibration of C — H bond. The bands at 1456 and 1385 cm⁻¹ are attributed to the bending vibration of C — H bond. The bands at 1126, 1090 and 1055 cm⁻¹ can be attributed to the stretching vibration of C — O or C — N bond. The bands at 858 and 596 cm⁻¹ are the stretching vibration of Sr — O and Ti — O bond, respectively. Therefore, the FTIR spectrum revealed organic groups bonded on the SrTiO₃ precursor, suggesting it was an organic-inorganic hybrid. After calcination at 550°C for 6 h, the broad absorption peaks at 3430 and 1639 cm⁻¹ attributed to the stretching and bending vibration of O — H bond still presented, confirming some hydroxyl groups bonded on the product. The absorption peak at 1385 cm⁻¹ was associated with the bending vibration of C — H bond. The band at 1090 cm⁻¹ can be attributed to the stretching vibration of C — N bond. The band at 588 cm⁻¹ is the stretching vibration of Ti — O bond. Thus, it can be inferred that 1, 6-hexanediamine molecules were bonded on the surface of pristine SrTiO₃ even after calcination.

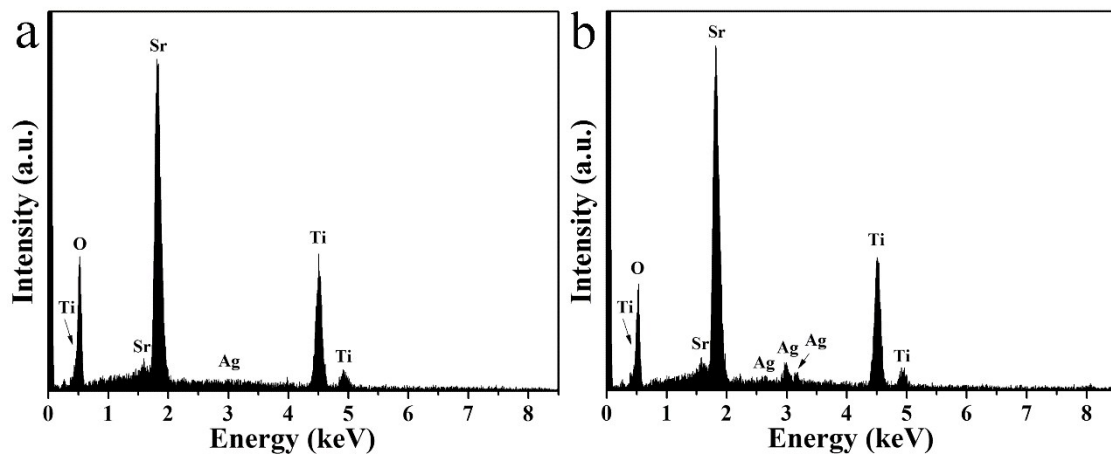


Fig. S3 EDX spectra of 2% (a) and 10% Ag@SrTiO₃ (b).

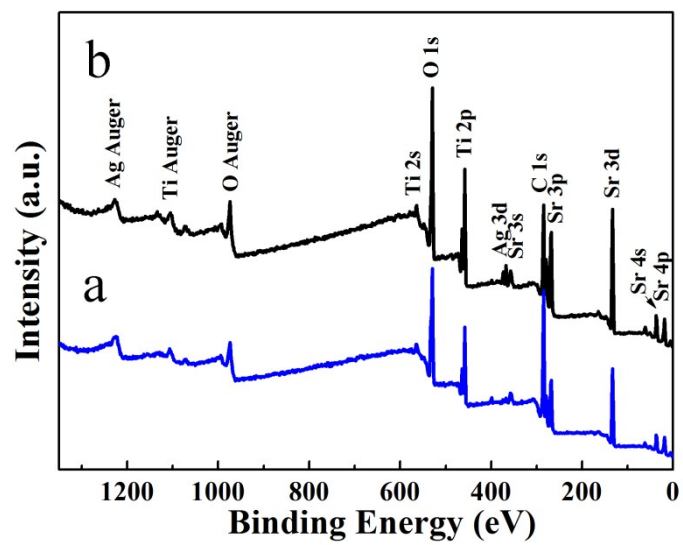


Fig. S4 Survey XPS spectra of (a) 2% and (b) 10% Ag@SrTiO₃.

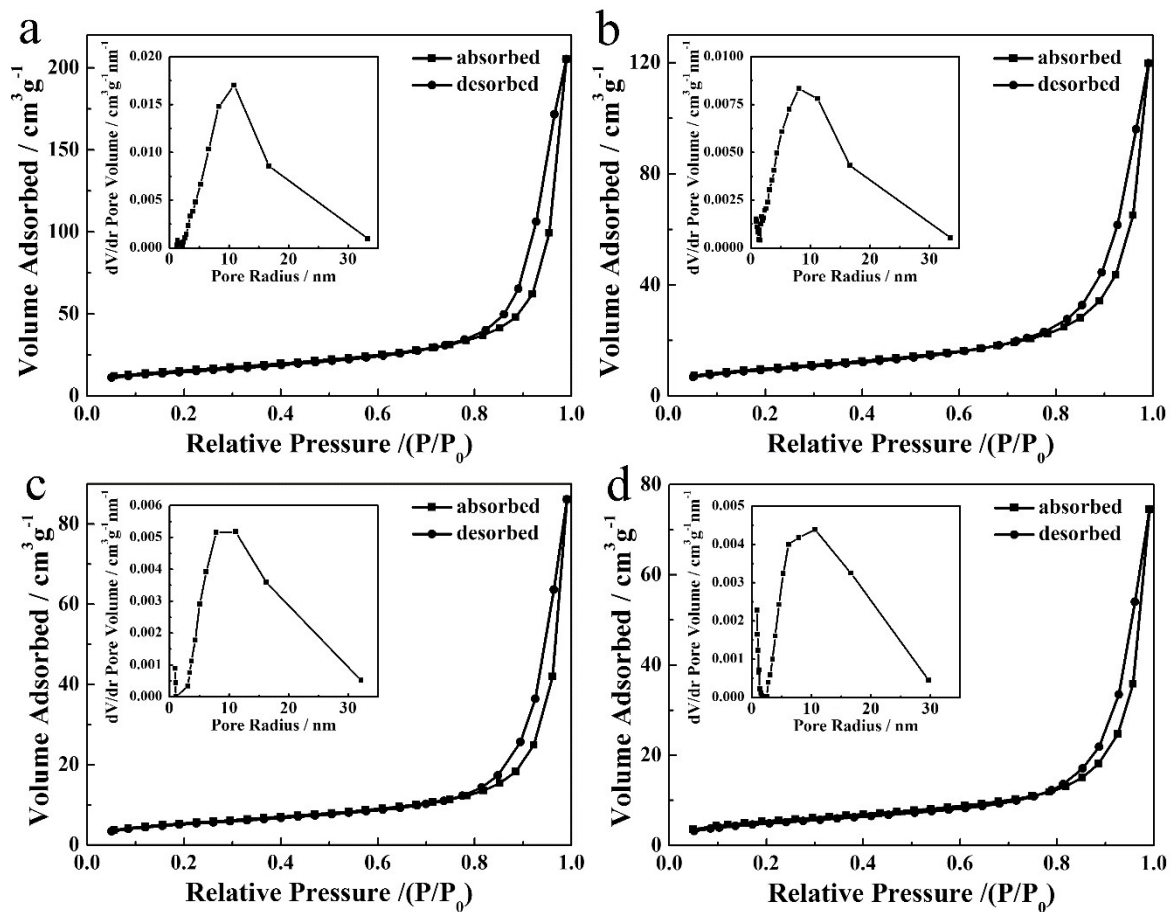


Fig. S5 Nitrogen adsorption–desorption isotherm of the catalysts. The inset is its BJH pore-size distribution curve. (a) SrTiO_3 . (b) 2% $\text{Ag}@\text{SrTiO}_3$. (c) 5% $\text{Ag}@\text{SrTiO}_3$. (d) 10% $\text{Ag}@\text{SrTiO}_3$.

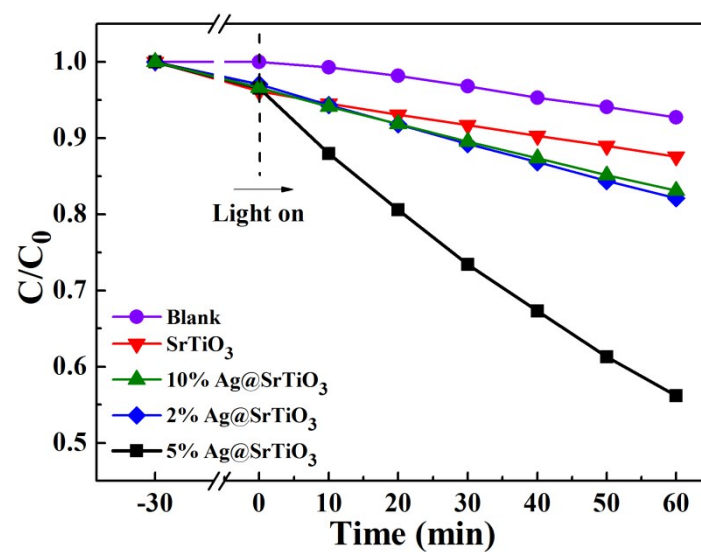


Fig. S6 Photocatalytic degradation curves of phenol aqueous solution in the presence of the pristine $SrTiO_3$ and $Ag@SrTiO_3$ nanocomposites as well as the blank.

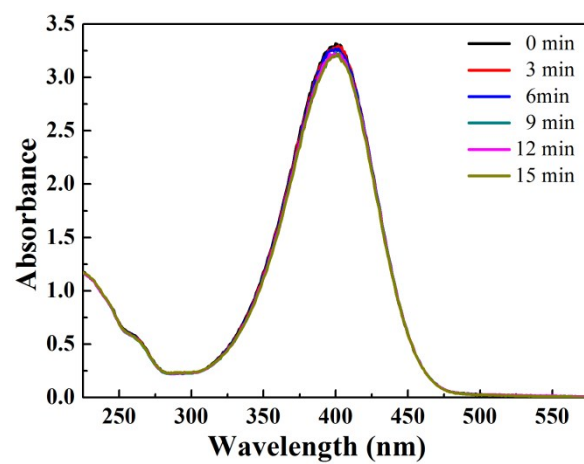


Fig. S7 Time-dependent UV-vis spectrum for the catalytic reduction of 4-NP by NaBH₄ in the presence of the pristine SrTiO₃.