Supporting Information

Constructing bulk defective perovskite SrTiO₃ nanocubes for high performance photocatalyst

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Figure S1. The optical images of SrTiO₃ (0:12, 3:9, 4:8, 5:7, 6:6, 7:5 and 9:3).
Figure S2. Field emission scanning electron microscopy (FE-SEM) images of SrTiO$_3$ 0:12 (A), 3:9 (B) and 9:3 (C).

Figure S3. The particles size distribution of SrTiO$_3$ 5:7.
Figure S4. Low resolution TEM images (A, C) and high resolution TEM images (B, D). SrTiO$_3$ 0:12 (A, B) and 9:3 (C, D). Insets of A and C are the particles size distribution of SrTiO$_3$ 0:12 and 9:3.
Figure S5. XRD patterns of SrTiO$_3$ (0:12, 3:9, 4:8, 5:7, 6:6, 7:5 and 9:3).

Figure S6. The full XPS spectrum of SrTiO$_3$ (0:12, 3:9, 5:7 and 9:3).
**Figure S7.** The valence band XPS spectrum of SrTiO$_3$ (0:12, 3:9, 5:7 and 9:3).

**Figure S8.** Surface photovoltage response of SrTiO$_3$ 0:12 (A, B) and 5:7 (C, D).
Figure S9. The PL spectra of SrTiO$_3$ (0:12, 3:9, 4:8, 5:7, 6:6, 7:5 and 9:3).

Figure S10. The N$_2$ adsorption-desorption curves of SrTiO$_3$ 0:12 (A), 5:7 (B) and 9:3 (C). Insets of A, B and C are the pore size distribution curves.
**Figure S11.** The 50 mg of samples photocatalyst loaded with 1.0 wt% Pt is placed into an aqueous methanol solution (120 mL, 25 voL%) in a closed gas circulation system. The UV-Vis light and visible light irradiation are obtained from a 300 W Xe lamp without and with a UVCUT-420 nm filter. H₂ production rate of SrTiO₃ (0:12, 3:9, 4:8, 5:7, 6:6, 7:5 and 9:3) under UV-Vis light irradiation (A). B is the H₂ production under visible light irradiation. The recycling measurements of H₂ production of SrTiO₃ 5:7 under UV-Vis light irradiation (C) and visible light (D) irradiation.