

Synthesis of SrTiO₃ submicro cubes with simultaneous and competitive photocatalytic activity for H₂O splitting and CO₂ reduction

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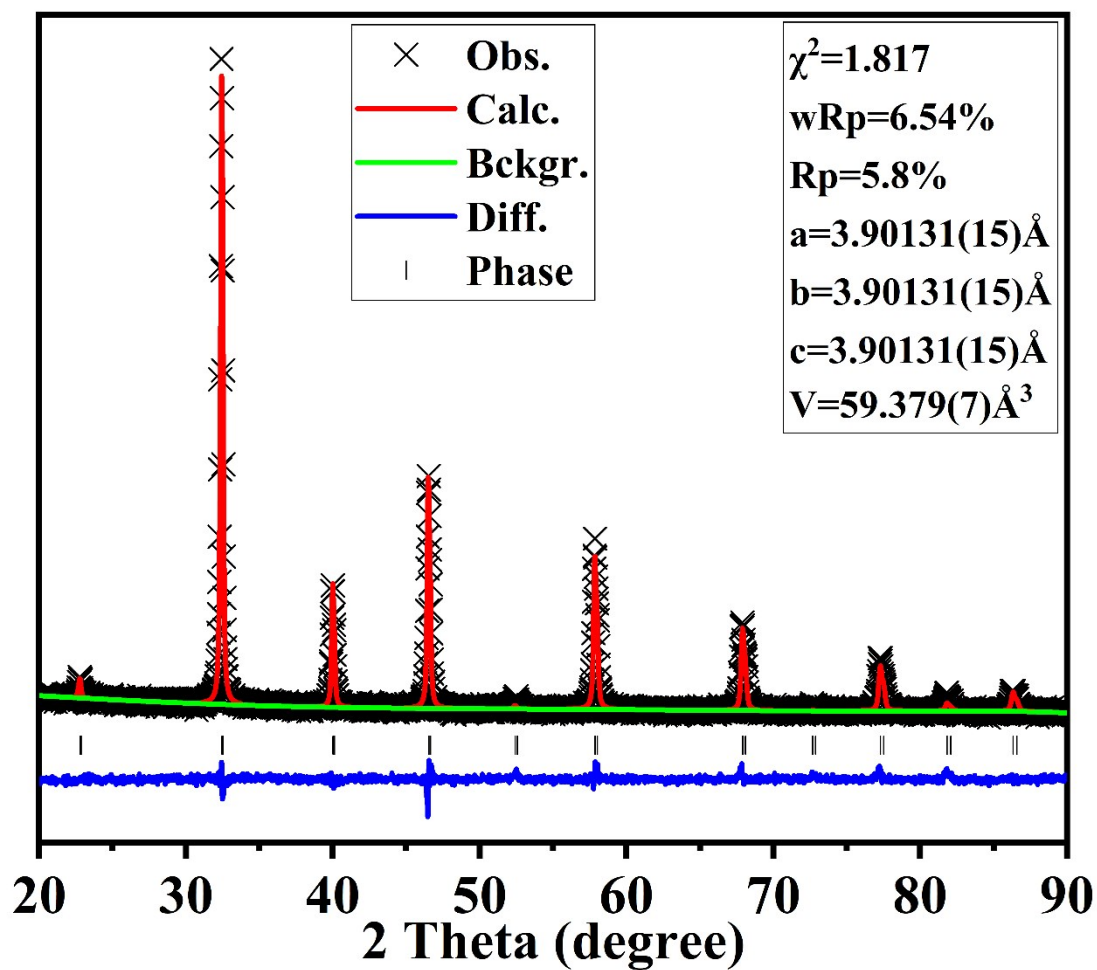


Fig. S1 XRD Rietveld refinement (wRp = 6.54%, Rp = 5.8%, $\chi^2=1.817$) of the as-prepared SrTiO₃ synthesized by molten salt method.

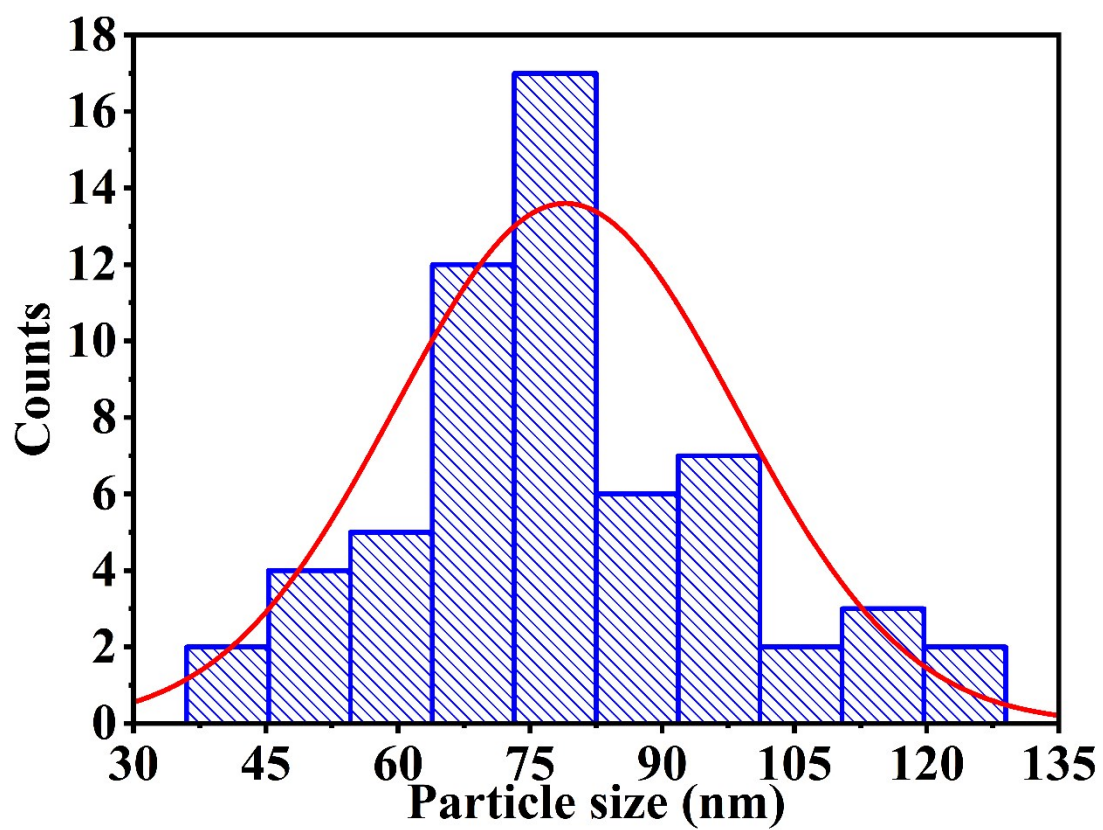


Fig. S2 Particle size distribution diagram of the prepared sample.

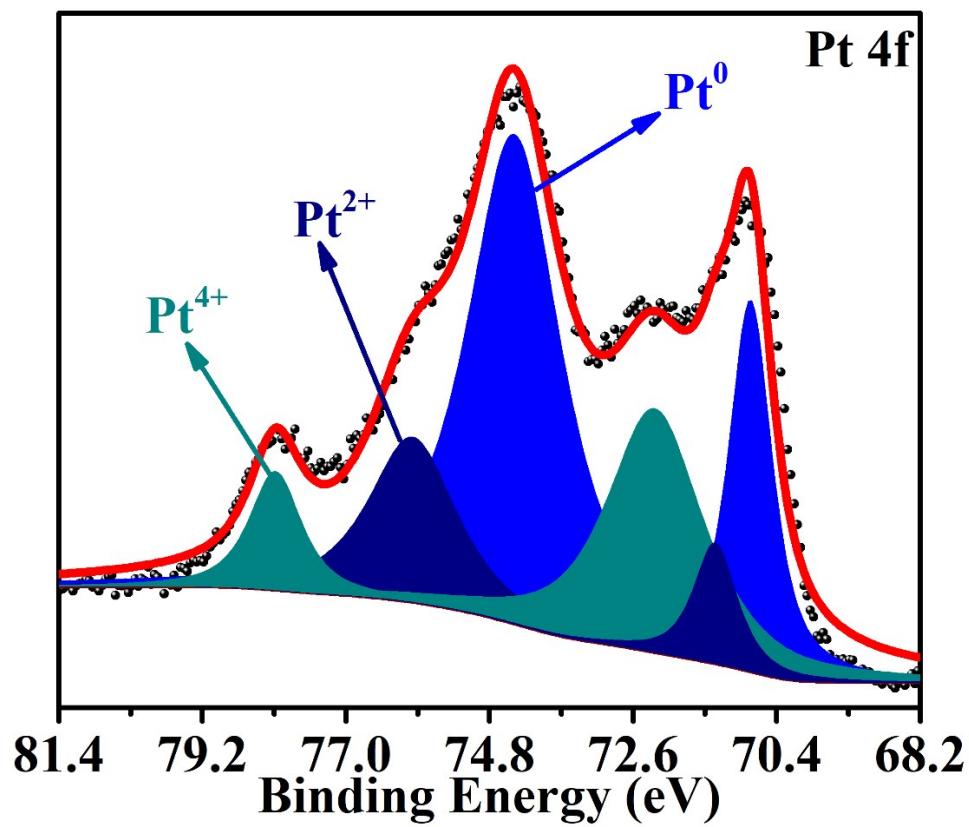


Fig. S3 High resolution XPS patterns of loaded Pt.

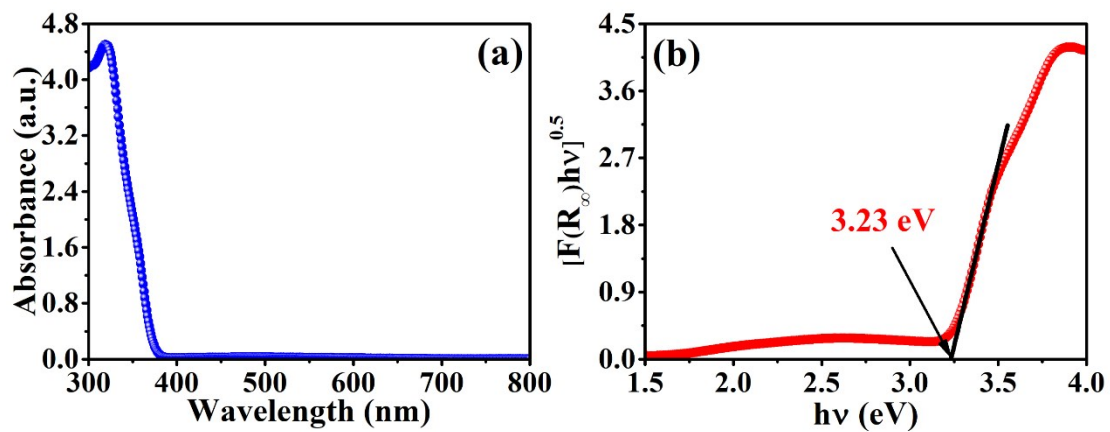


Fig. S4 (a) UV-vis spectra of the SrTiO₃ sample (b) Tauc plots for the determination of optical band gap for SrTiO₃

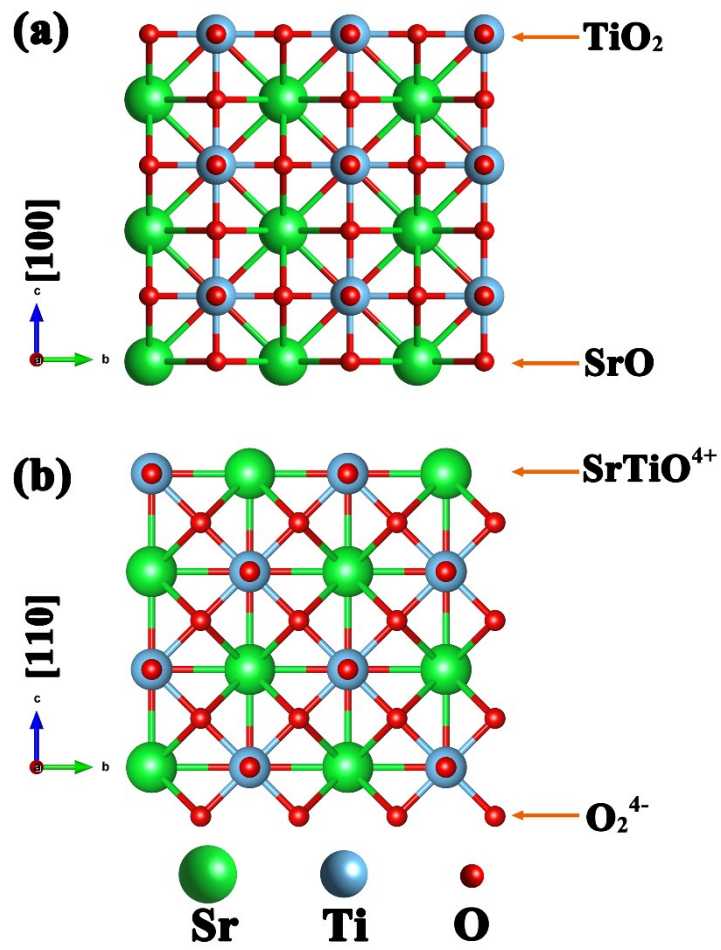


Fig. S5 (a) The terminal plane of (100) facet of SrTiO₃; (b) The terminal plane of (110) facet of SrTiO₃.

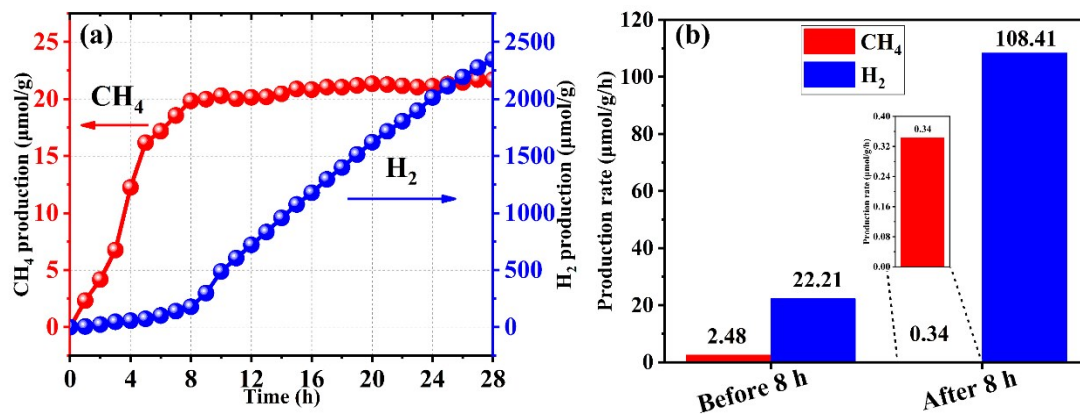


Fig. S6 (a) Photocatalytic reduction of CO_2 of the third repetitive test over STO-Pt under simulated sunlight with 20% volume ratio of triethanolamine (TEOA) as sacrificial agent, (b) Production rate change before and after eighth hour of the third repetitive test.

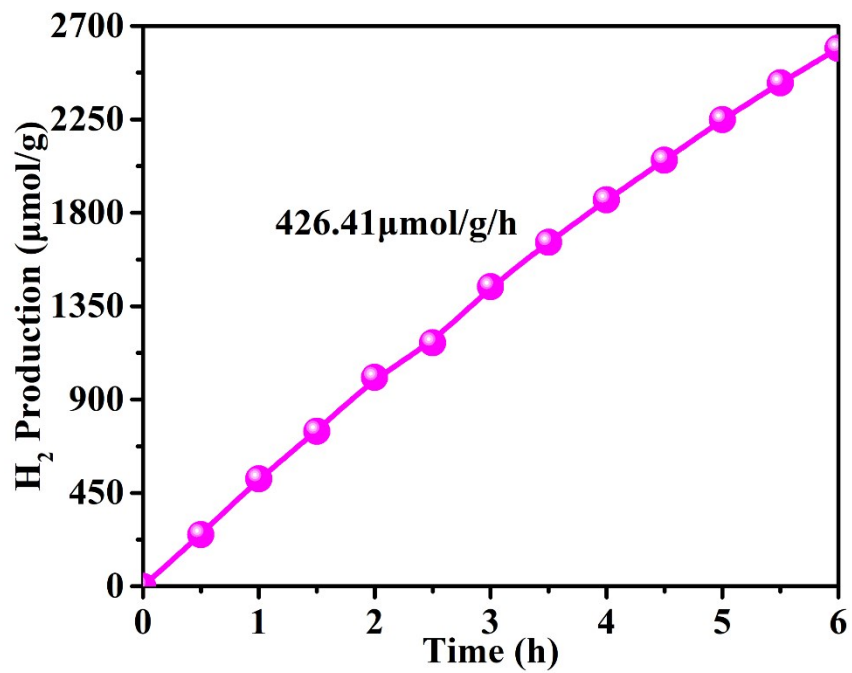


Fig. S7 Photocatalytic water splitting performance of SrTiO₃ with 3 wt% Pt under Simulated sunlight with twenty percent volume ratio triethanolamine (TEOA) as sacrificial agent.

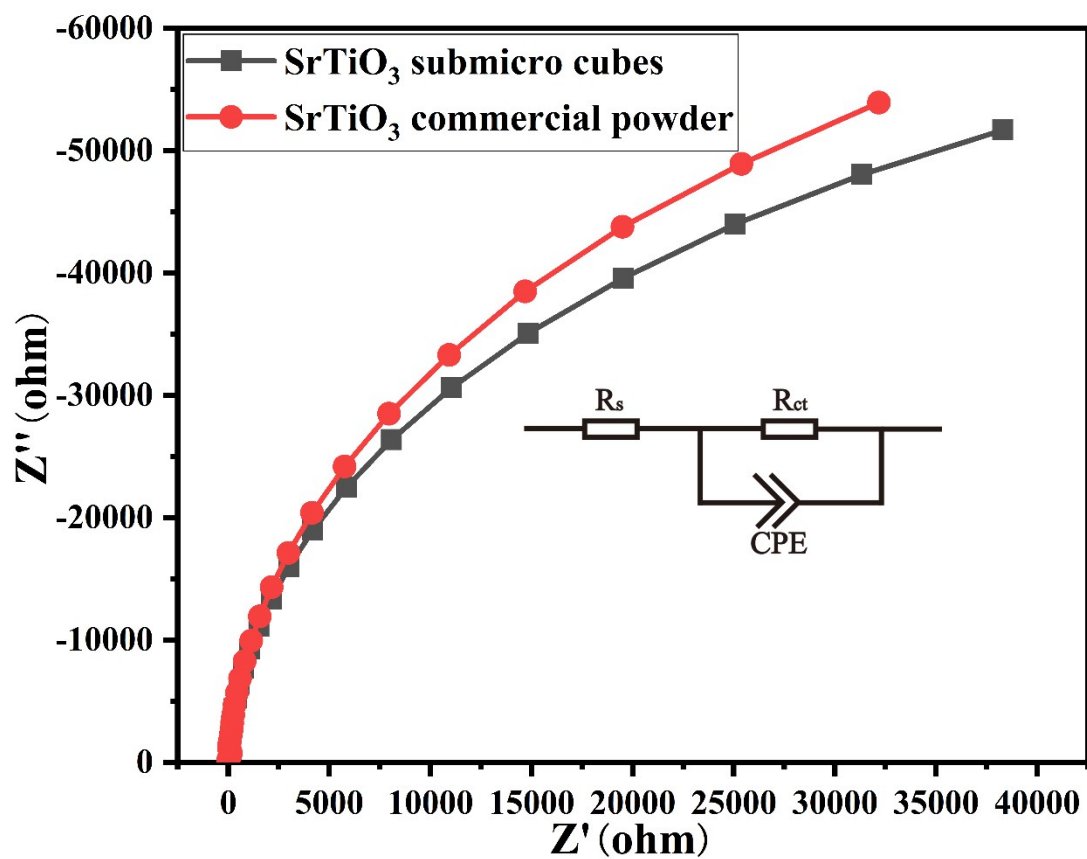


Fig. S8 Nyquist plots of different catalysts in 0.5 mol L⁻¹ Na₂SO₄ electrolyte.

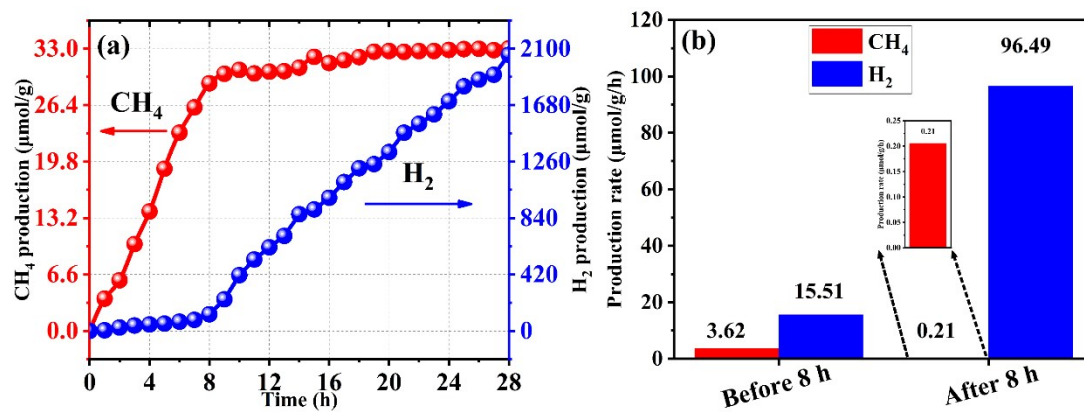


Fig. S9 (a) Photocatalytic reduction of CO₂ over STO-Pt under simulated sunlight with 10% volume ratio of triethanolamine (TEOA) as sacrificial agent, (b) Production rate change before and after eighth hour.

Table S1. Comparison of photocatalytic CO₂ reduction and H₂O splitting performance over other Ti-based perovskite photocatalysts.

samples	cocatalyst	catalyst quantity ^a	light source	reaction solution	CH ₄ rate ^b	H ₂ rate ^b	refs
SrTiO ₃	Pt (3.0 wt%)	50/100	300 W X L	TEOA (20%)	4.39/0.46	14.52/120.23	this work
SrTiO ₃	Pt (3.0 wt%)	50/100	300 W X L	TEOA (20%)	-----	426.41	this work
SrTiO ₃	-----	100/25	300 W X L	methanol (20%)	-----	0.31	[1]
N, S & Fe-SrTiO ₃	-----	400/400	77 W Hg lamp	0.2 mol L ⁻¹ NaOH	0.16	1.7	[2]
SrTiO ₃ /ZnTe	-----	10/150	300 W X L (>420 nm)	CO ₂ , H ₂ O gas	2.38	-----	[3]
Cr-SrTiO ₃	-----	20/80	300 W X L (λ >420 nm)	CO ₂ , H ₂ O gas	0.88	-----	[4]
BaTiO ₃	-----	200/0.0113	6 Wcm ⁻² UV-lamp	CO ₂ , H ₂ O gas	0.82	-----	[5]
NiTiO ₃	-----	50/10	350 W X L	CO ₂ (6 bar)	12.8	-----	[6]
P123@ SrTiO ₃	-----	10/100	300 W X L	TEOA (20%)	-----	402	[7]
a:	mg/mL;		b:	μ mol		g ⁻¹	h ⁻¹

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