

Supplementary Materials

Ni(OH)₂-Modified SrTiO₃ for Enhanced Photocatalytic Hydrogen Evolution Reaction

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Table. S1. Physicochemical properties of SrTiO₃, Ni(OH)₂/SrTiO₃ and Ni(OH)₂ samples.

Samples	R	Ni(OH) ₂ (mol%) (ICP-OES)	S _{BET} (m ² g ⁻¹)	Pore volume (cm ³ g ⁻¹)
N0	0	0	3.2844	0.0218
N0.5	0.5	0.376	3.7696	0.0189
N5	5	4.73	14.8100	0.0512
N10	10	8.05	46.8466	0.1099
N20	20	18.96	52.6024	0.1245
N25	25	23.68	67.2800	0.1678
N100	100	100	357.7338	0.6153

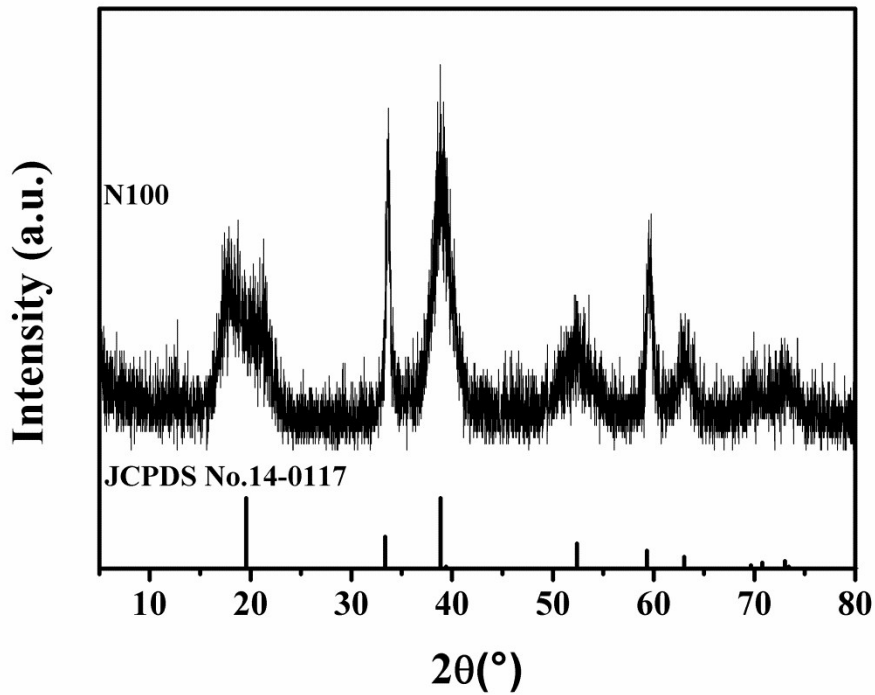


Fig. S1. XRD patterns of sample N100 and Ni(OH)₂ (JCPDS No.14-0117).

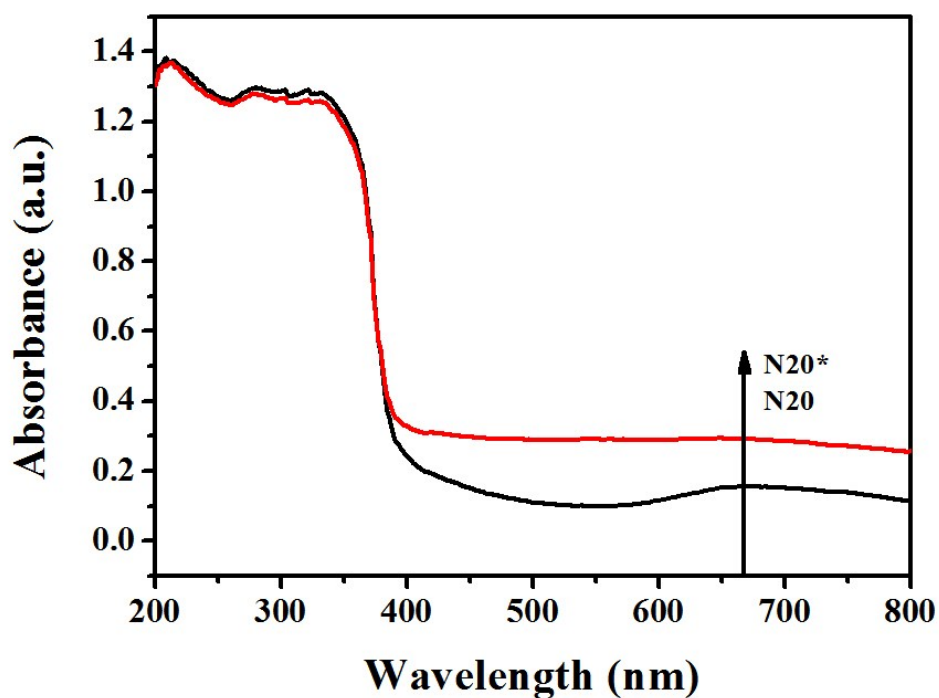


Fig. S2. UV-vis diffuse reflectance spectra of N20 and N20* (after 3 hours of hydrogen production).

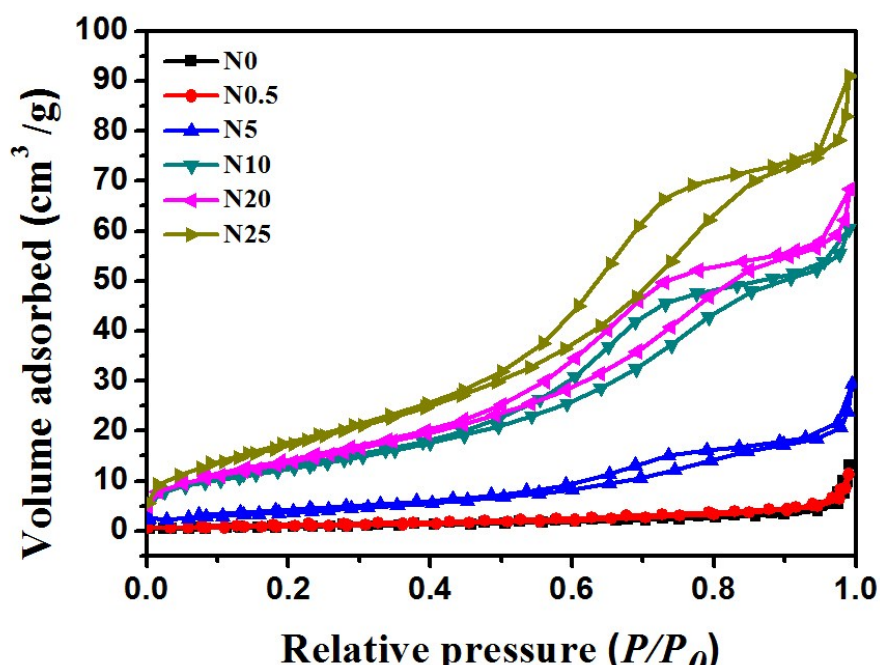


Fig. S3. Nitrogen adsorption-desorption isotherms of samples N0, N0.5, N5, N10, N20, N25, N100.

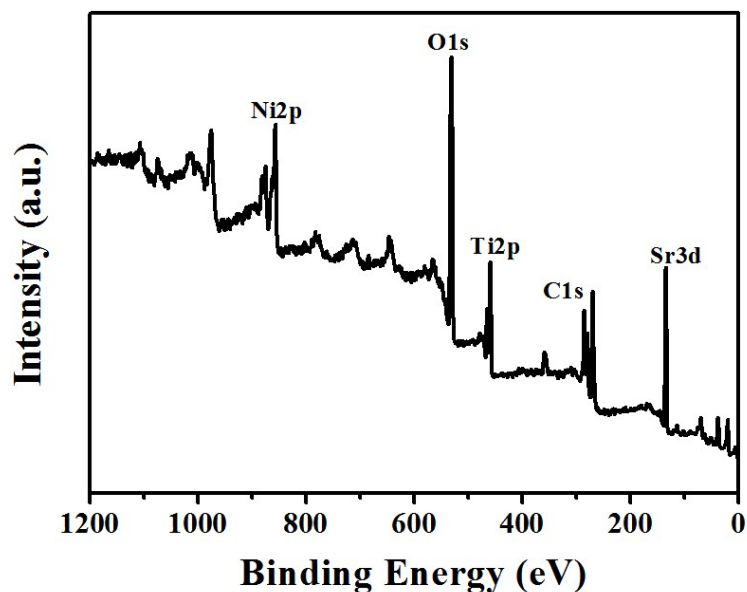


Fig. S4. The XPS survey spectrum of N20.

The XPS survey spectrum of N20 indicates that Sr, Ti, Ni, O, and C elements are observed and their corresponding photoelectron peaks appear at the binding energies of 130 eV (Sr 3d), 458 eV (Ti 2p), 856 eV (Ni 2p), 531 eV (O 1s), and 286 eV (C 1s), respectively. The carbon peak is attributed to the residual carbon from the sample and adventitious hydrocarbon from the XPS instrument itself.

Table S2 Comparative results of hydrogen production rate from the photocatalytic water splitting over various SrTiO₃-based photocatalysts.

Photocatalyst	Scavenger	Reaction conditions	Light source	H ₂ production rate	References
20 mol.% Ni(OH) ₂ /SrTiO ₃	MeOH	0.025 g of photocatalyst, 40 ml of 25 vol.% aqueous MeOH solution	300 W UV Xe lamp	1461.7 (μmolh ⁻¹ g ⁻¹)	This work
0.5 wt.% Cu-SrTiO ₃	MeOH	0.15 g of photocatalyst, 38ml MeOH and 342ml water. H ₂ PtCl ₆ ·6H ₂ O (183 μl, c = 62.6 mmol L ⁻¹)	300 W Hg lamp	800 (μmolh ⁻¹ g ⁻¹)	1

SrTiO ₃ -TiO ₂	MeOH	-	300 W Xe lamp	314.9 (μmolcm ⁻² h ⁻¹)	2
Pt (0.5 wt.%) SrTiO ₃ : Rh (1 mol%)	MeOH	0.05 g of photocatalyst, 50ml of 20 vol.% aqueous MeOH solution	300 W Xe lamp (λ > 420 nm)	962 (μmol h ⁻¹ g ⁻¹)	3
1% Rh-doped 0.1 wt.% Pt-loaded SrTiO ₃	MeOH	0.3 g of photocatalyst, 150 ml of 10 vol.% aqueous MeOH solution	300 W Xe lamp with cutoff filter (λ > 440 nm)	117 (μmolh ⁻¹ g ⁻¹ cat ⁻¹)	4
4 mol% Cr-, 4 mol% Ta-doped 1 wt.% Pt loaded SrTiO ₃	MeOH	1 g of photocatalyst, 310 ml of 6.5 vol.% aqueous MeOH solution	300 W Xe lamp with cutoff filter (λ > 440 nm)	70 (μmolh ⁻¹ g ⁻¹ cat ⁻¹)	5
CdS/SrTiO ₃ 3wt%	MeOH	-	310 W/m ² , XHA500	169 (μmol h ⁻¹ g ⁻¹)	6
950°C, 1% Zn doped 0.2% (w%) CoO/SrTiO ₃	Na ₂ CO ₃	0.1 g of photocatalyst, 800 ml of aqueous Na ₂ CO ₃ solution	400 W Hg lamp	315 (μmol h ⁻¹ g ⁻¹)	7
1 wt.% Au-loaded mesoporous assembled SrTiO ₃	CHOOH	0.2 g of photocatalyst, 200 ml of 2.5 vol.% aqueous CHOOH solution	176 W Hg lamp	647 (μmol h ⁻¹ g ⁻¹ cat ⁻¹)	8

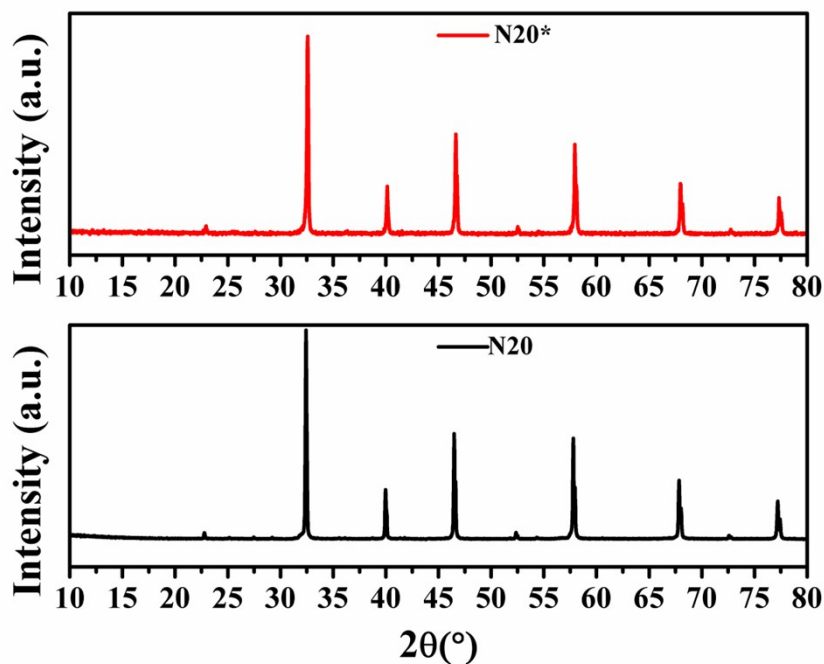


Fig. S5. XRD patterns of samples N20 and N20* (after 3 hours of hydrogen production)

The XRD patterns of the sample after 3 hours of photocatalytic hydrogen production and N20 (before the reaction) to further prove the stability of the sample.

Reference

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