Noble-Metal-Free Cobalt Phosphide to Boost the Photocatalytic Overall Water Splitting Activity of $SrTiO_3$(Al)

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Results

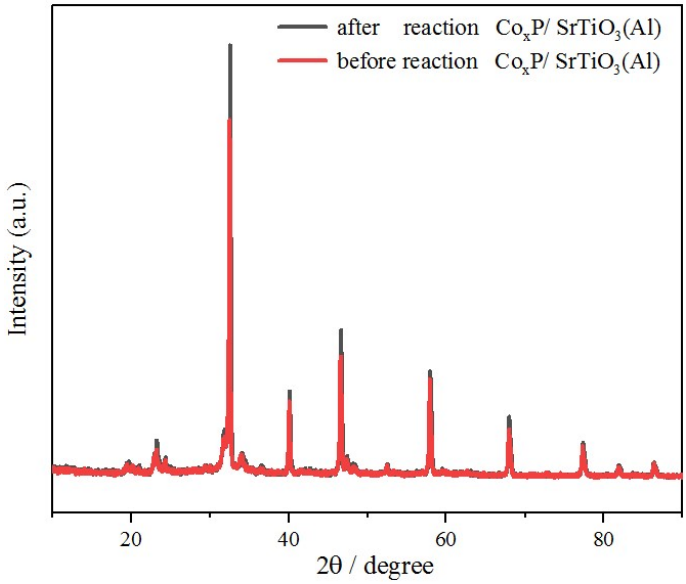

Fig. S1 XRD patterns of pristine (red) and used (black) catalysts

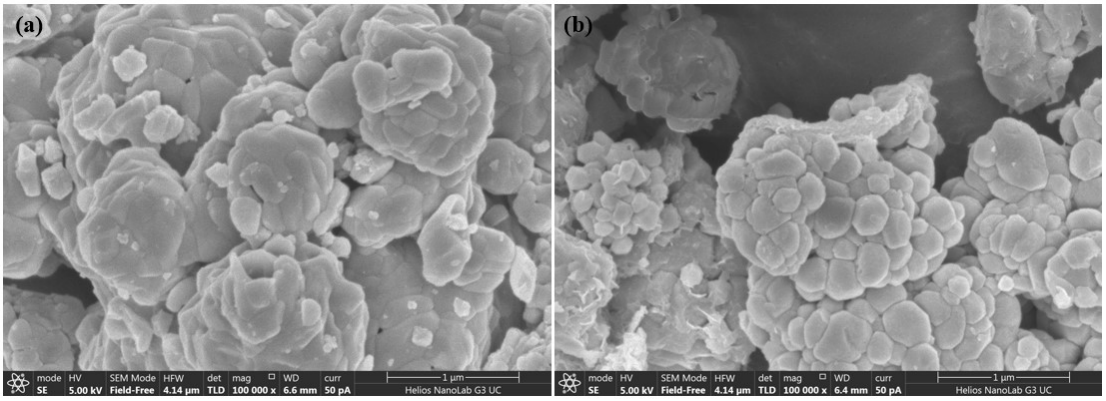

Fig. S2 SEM image of (a)$SrTiO_3$(Al) and (b)$Co_xP/SrTiO_3$(Al)

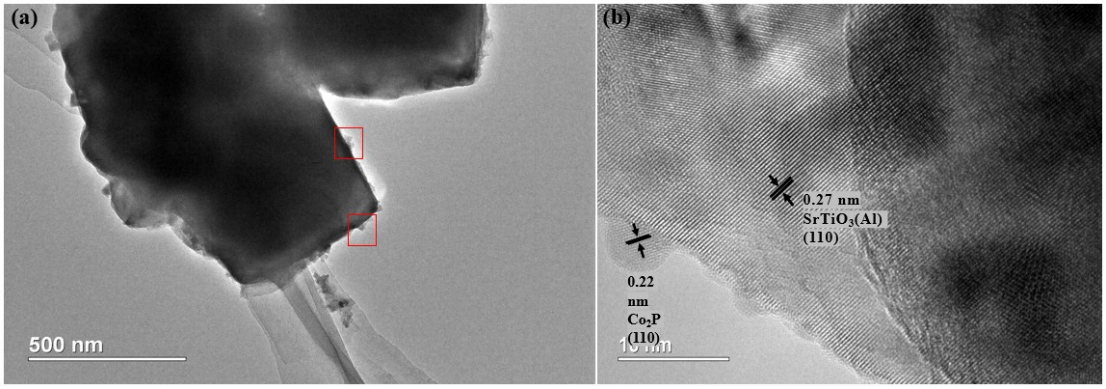

Fig. S3 TEM image of $Co_xP/SrTiO_3$(Al) after four times reaction

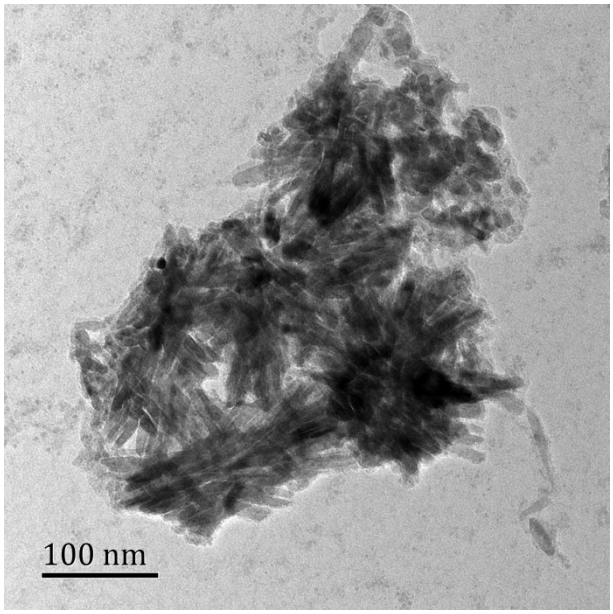

Fig. S4 TEM image of Co_xP nanobelts

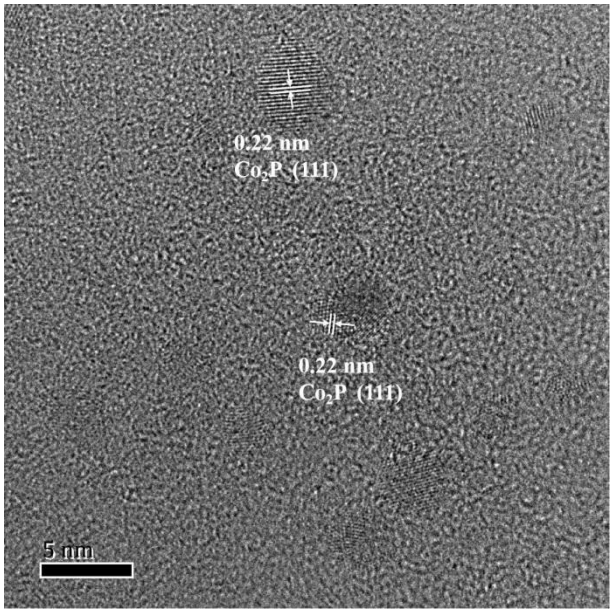

Fig. S5 HRTEM image of Co_xP nanoparticles

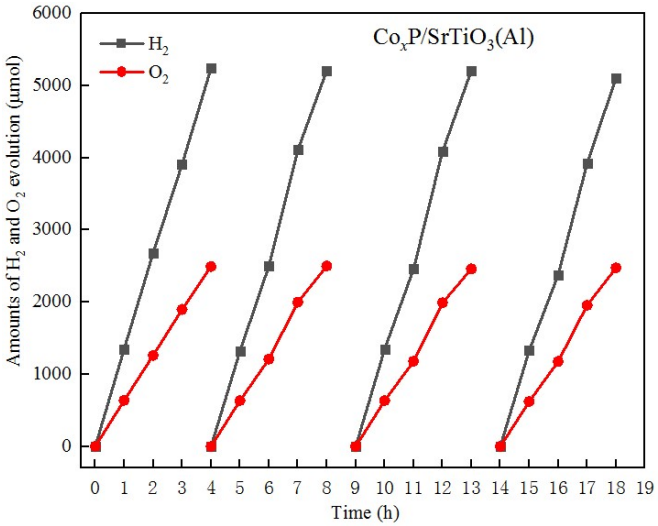

Fig. S6 Time course and stability of $Co_xP/SrTiO_3(Al)$

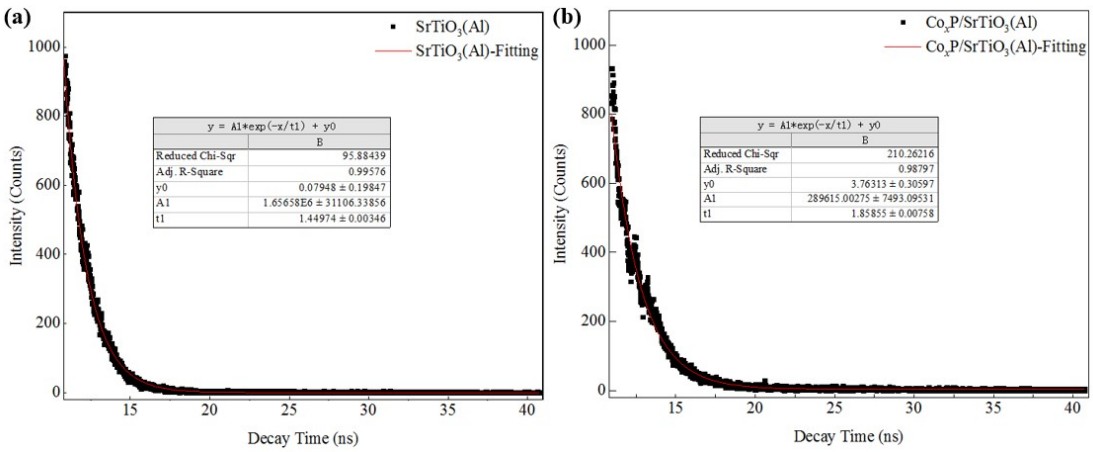

Fig. S7 TRPL spectra of (a) $SrTiO_3$(Al) and (b) $Co_xP/SrTiO_3$(Al) fitting by single exponential functions

Table 1 Various $SrTiO_3$-based composites for photocatalytic overall water splitting.

Photocatalysts	Light source	H_2 evolution rate ($\mu mol \cdot g^{-1} \cdot h^{-1}$)	O_2 evolution rate ($\mu mol \cdot g^{-1} \cdot h^{-1}$)	Ref.
$Co_xP/SrTiO_3$(Al)	280 W Xe lamp, full arc	1360	638	This work
Ni SA-NG/$SrTiO_3$(Al)/CoO_x	280 W Xe lamp, full arc	498	250	[1]
Ni SA-NG/$SrTiO_3$(Al)/CoO_x	280 W Xe lamp, full arc	498	250	[2]
Ni@NiO_x-$SrTiO_3$	1.5 AM solar simulator	18	7.2	[3]
Rh/Cr_2O_3-$SrTiO_3$:Al-CoO_x	300 W Xe lamp, full arc	4 mmol/h	2 mmol/h	[4]
$Rh_{2-y}Cr_yO_3$-$SrTiO_3$:Al	Xe lamp, 240 mW/cm^2, full arc	530	265	[5]

Table 2 Energy structure parameters of $SrTiO_3$(Al) and Co_xP [a]

Samples	E_{SC} (eV)	E_{HOMO} (eV)	Ion potential (eV)	VBM (V vs. SHE)	CBM (V vs. SHE)
$SrTiO_3$(Al)	17.75	3.93	7.7	2.96	-0.3
Co_xP	-	-	-	-	-0.26

[a]: The E_{SC}, E_{HOMO}, ion potential and VBM values are determined by UPS spectra. The CBM values are determined by Mott-Schottky plots.

References

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