Supporting Information for Enhanced the Photocatalytic CO_2 Reduction using Trimetallic Organic Framework as the catalyst Under Visible Light.

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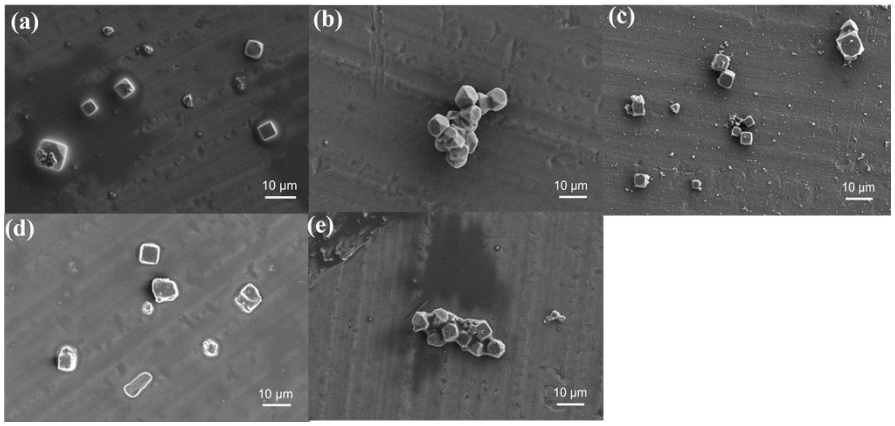

Figure S1. SEM images (scale: 10μm) (a-e) of the $Fe_{0.02}Ni_{0.10}$-Co_x –PCN-250 (x=0，0.05，0.10，0.20 mol) and $Fe_{0.02}Co_{0.10}$-PCN-250.

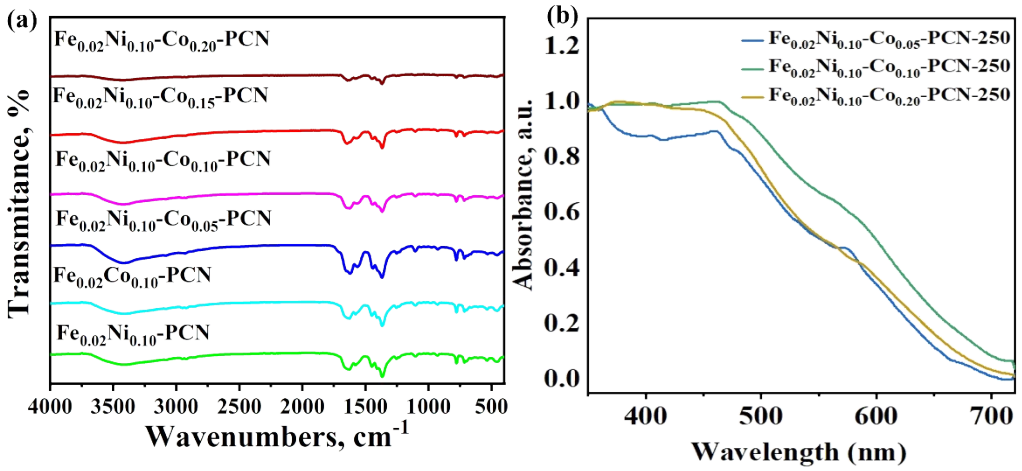

Figure S2. (a) FT-IR spectra of $Fe_{0.02}Ni_{0.10}$-Co_x –PCN-250 (x=0，0.05，0.10，0.20 mol) and $Fe_{0.02}Co_{0.10}$-PCN-250. (b) UV–vis diffuse reflectance spectra of $Fe_{0.02}Ni_{0.10}$-Co_x-PCN-250 (x=0.05, 0.10, 0.20 mol).

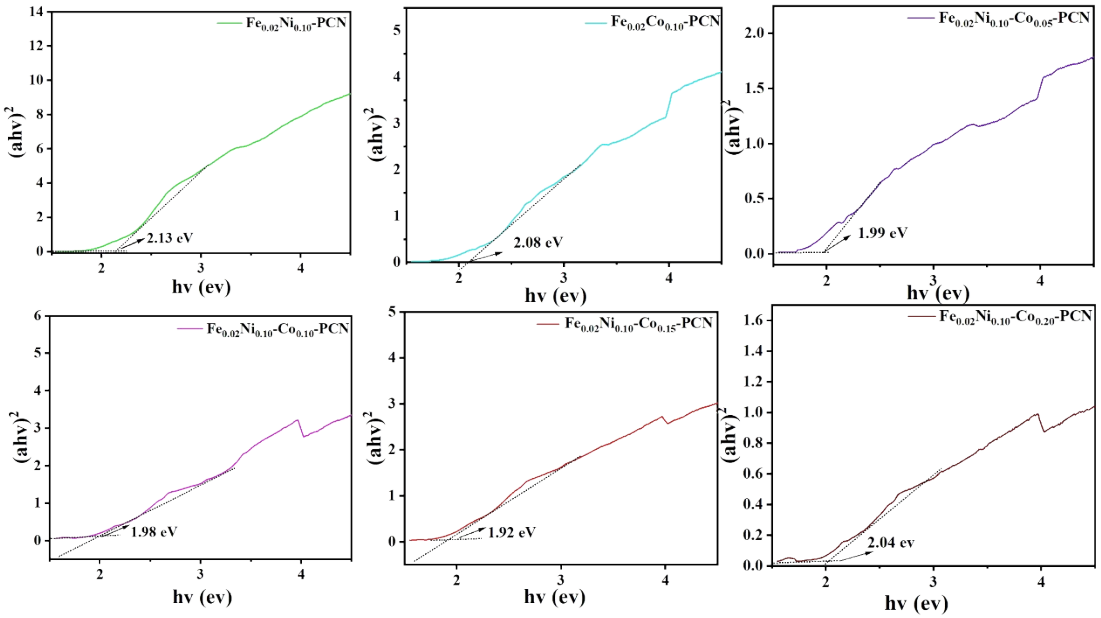

Figure S3. Tauc plot of $Fe_{0.02}Ni_{0.10}$-Co_x –PCN-250 (x=0，0.05，0.10，0.20 mol) and $Fe_{0.02}Co_{0.10}$-PCN-250 for band gap calculation based on the UV-vis diffusion spectrum.

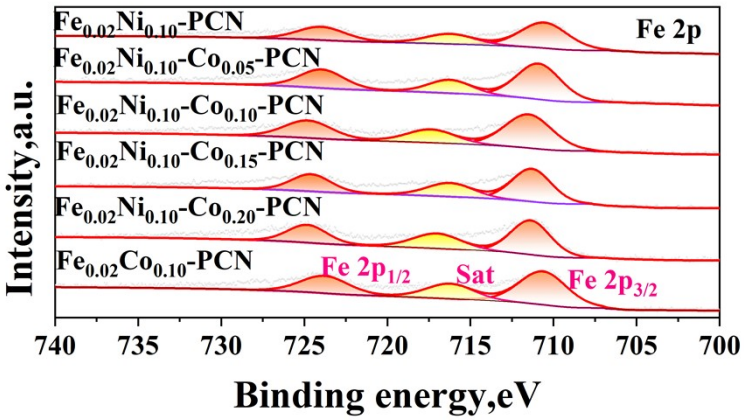

Figure S4. High-resolution XPS spectra of the Fe 2p.

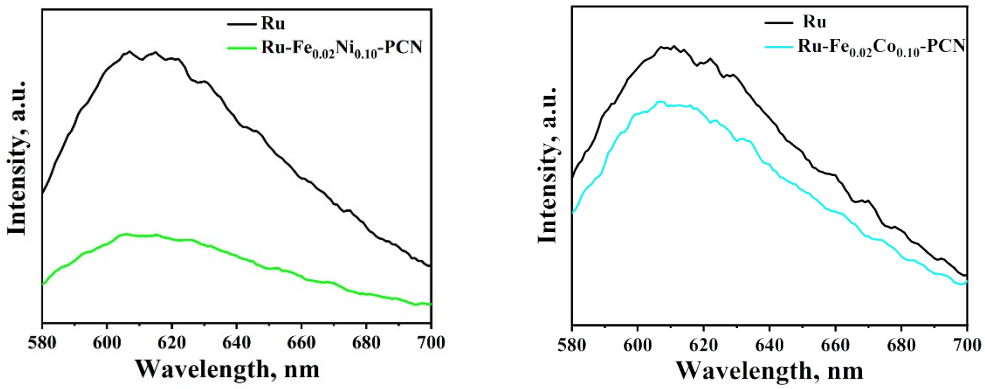

Figure S5. Steady state photoluminescence emission spectra of Ru upon the addition of $Fe_{0.02}Ni_{0.10}$-PCN-250 (x=0mol) and $Fe_{0.02}Co_{0.10}$-PCN-250 (λex=365 nm) in a CO_2 degassed solution of CH_3CN/TEOA.

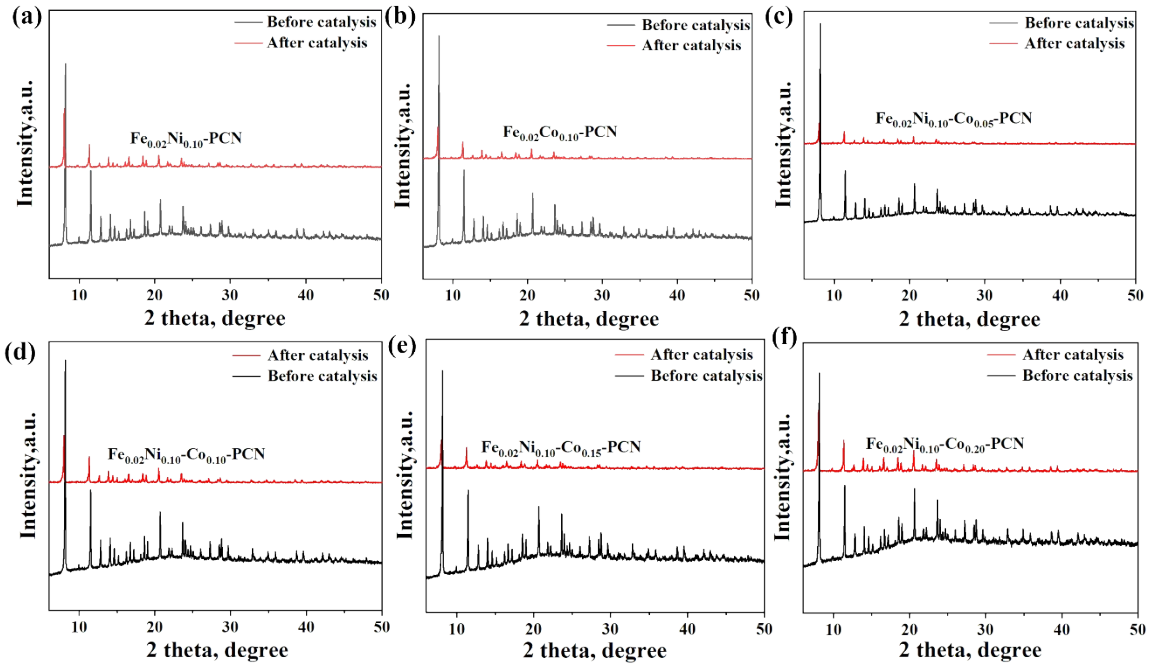

Figure S6. PXRD patterns of the $Fe_{0.02}Ni_{0.10}$-Co_x –PCN-250 (x=0，0.05，0.10，0.20 mol) and $Fe_{0.02}Co_{0.10}$-PCN-250 before and after photocatalysis.

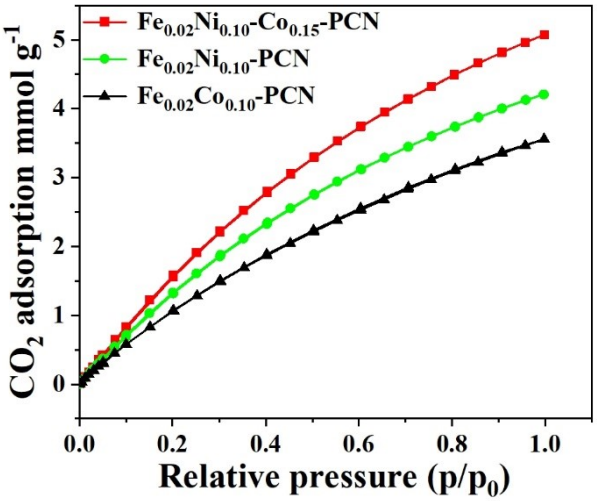

Figure S7.The CO_2 adsorption isotherms (273K) of $Fe_{0.02}Ni_{0.10}$–PCN-250, $Fe_{0.02}Co_{0.10}$–PCN-250 and $Fe_{0.02}Ni_{0.10}$-$Co_{0.15}$ –PCN-250.

	$Fe_{0.02}Ni_{0.10}$-PCN-250	**$Fe_{0.02}Ni_{0.10}$-$Co_{0.05}$-PCN-250**	**$Fe_{0.02}Ni_{0.10}$-$Co_{0.10}$-PCN-250**
mol%	Fe:17.55	Fe:13.25	Fe:14.1
	Ni:10.2	Ni:9.2	Ni:8.0
	Co:-0.0003	Co:3.4	Co:3.7
Fe:Ni:Co	1: 0.58:-	1: 0.69: 0.256	1 : 0.57: 0.262
	$Fe_{0.02}Ni_{0.10}$-$Co_{0.15}$-PCN-250	**$Fe_{0.02}Ni_{0.10}$-$Co_{0.20}$-PCN-250**	**$Fe_{0.02}$-$Co_{0.10}$-PCN-250**
mol%	Fe:17.6	Fe:10.4	Fe:17.4
	Ni:6.3	Ni:5.7	Ni:0.043
	Co:7.3	Co:7.2	Co:8.65
Fe:Ni:Co	1: 0.36: 0.414	1: 0.54: 0.692	1: - :0.497

Table S1. The inductively coupled plasma mass spectrometry (ICP-MS) of $Fe_{0.02}Ni_{0.10}$-Co_x – PCN-250 (x=0，0.05，0.10，0.20 mol) and $Fe_{0.02}Co_{0.10}$-PCN-250 materials.