

Supplemental Materials for
Photocatalytic CO₂ Reduction of C/ZnO nanofibers enhanced by Ni-NiS cocatalyst

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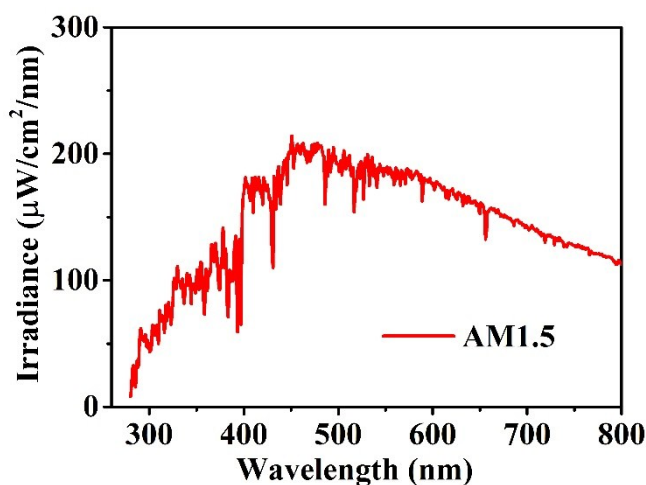


Fig. S1 Light spectrum of the 350 W Xe lamp

Table S1 Ni/NiS mass ratio for samples C-ZNNS20, C-ZNNS60 and C-ZNNS120.

	Ni (wt%)	S (wt%)	metallic Ni (wt%)	NiS (wt%)	metallic Ni/NiS (wt%:wt%)
C-ZNNS20	2.56	0.87	0.967	2.463	0.392
C-ZNNS60	3.56	1.21	1.345	3.425	0.393
C-ZNNS120	4.99	1.69	1.893	4.787	0.395

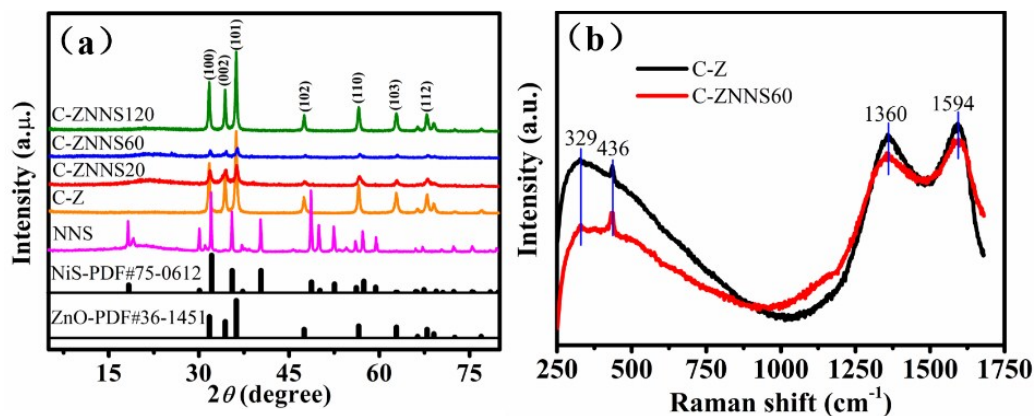


Fig. S2 (a) XRD patterns of C-Z, NNS, C-ZNNS20, C-ZNNS60 and C-ZNNS120. (b) Raman spectra of C-Z and C-ZNNS60.

Fig. S2(a) shows the XRD patterns of C-Z, NNS, C-ZNNS20, C-ZNNS60 and C-ZNNS120. The XRD pattern of C-Z shows characteristic peaks that could be attributed to wurtzite ZnO (JCPDS No. 36-1451). C-ZNNS20, C-ZNNS60 and C-ZNNS120 showed peaks that were nearly identical to those of pristine C-Z, likely because some peaks of Ni-NiS coincide with those of C-Z (31.8° , 36.3° , 56.6° , and 69.1°).¹ Moreover, the low content of Ni-NiS renders it virtually undetectable in the XRD pattern of the composite samples. In addition to the low content, the cocatalyst Ni-NiS could also be amorphous.

Raman spectra were used to study the chemical structure of carbon in C-Z and C-ZNNS60 (Fig. S2(b)). Two major peaks at 1360 (D band) and 1594 (G band) cm^{-1} were observed in the C-Z spectrum. The relative intensity of the D-band reflects the degree of crystal structure disorder, and that of the G-band represents the first-order scattering the E 2g vibration mode, which is used to characterize the sp^2 bond structure of carbon. The intensity ratio of ID/IG was 0.95, thereby indicating that the carbon in C-Z is mainly amorphous in nature. The characteristic peaks of ZnO at 329 and 436 cm^{-1} could be assigned to transverse acoustic overtone scattering and the E2(M) vibration mode, respectively.² The peak positions in the Raman spectra of C-ZNNS60 were similar to those of C-Z, but the peak intensities were slightly reduced, thus indicating that loading with Ni-NiS reduces the crystallinity of the materials to some extent.³ The absence of obvious Ni-NiS peaks confirmed that the content of cocatalyst was low and the Ni-NiS was amorphous, consistent with the previous XRD results.

References

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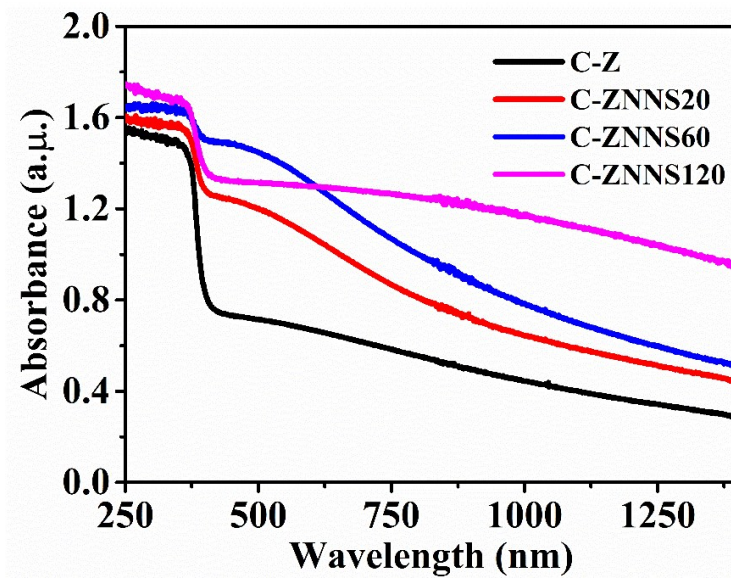


Fig. S3 UV-vis diffuse reflectance spectra of C-Z, C-ZNNS20, C-ZNNS60 and C-ZNNS120.