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Supporting Information

Z-scheme MoS_2/g-C_3N_4 heterojunction for efficient visible light photocatalytic CO_2 reduction

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In our experiment, CO were found to be the main reduction product and no other hydrocarbon product was detected. Furthermore, the oxidation product-O_2 and a small amount of competitive reduction product (H_2) were also detected. For the MSCN-10 sample, the average production rate of the products are calculated out and listed in Table 1 and the calculated molar ratios of electrons/holes according to the following equations (1 and 2) are 0.87 and 0.84 respectively, which is on the verge of 1:1. The deviation may be due to the adventitious oxygen in the suspension system or other undetected intermediates. Moreover, the high selective CO_2 reduction to CO in our experiment may be caused by the following reasons: active sites on the sample for CO_2 reduction reaction might be covered by the formed CO and intermediate products (·C)，leaving insufficient elections contacted with CO_2 molecules to produce CH_4. [1]

$$2H_2O + 4h^+ \longrightarrow O_2 + 4H^+ \quad (1)$$

$$CO_2 + 2H^+ + 2e^- \longrightarrow CO + H_2O \quad (2)$$

Sample	Reduction products	Oxidation products	Ratio
	CO ($\mu mol \cdot g^{-1} \cdot h^{-1}$)	O_2 ($\mu mol \cdot g^{-1} \cdot h^{-1}$)	$e^- : h^+$
CN	2.85	1.65	0.87:1
MSCN-10	8.37	4.94	0.84:1

Table. 1 The generation rate of the reduction and oxidation products for CN and MSCN-10.

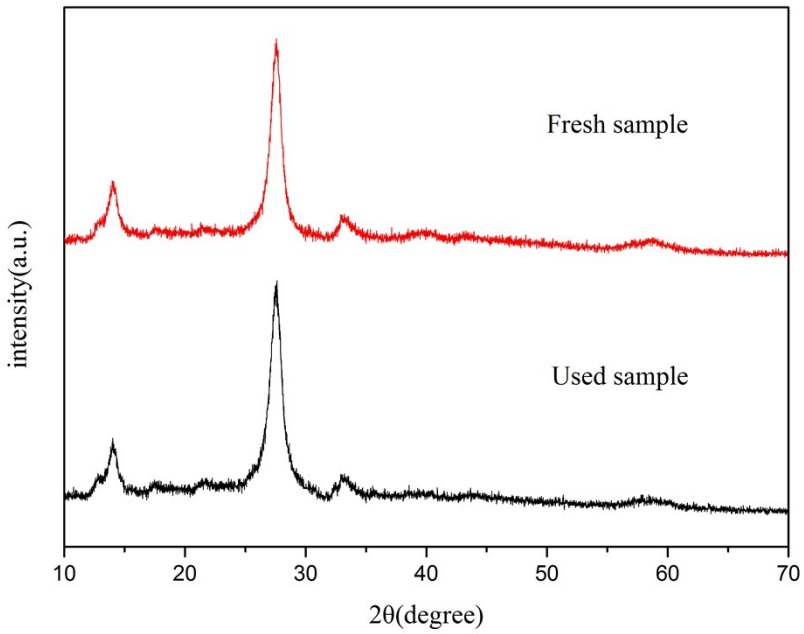

Fig. S1 XRD patterns of the freshly prepared and used MSCN-10 after three times cycling.

References

[1]. X. Wang, K. Maeda, A. Thomas, K. Takanabe, G. Xin, J. M. Carlsson, K. Domen and M. Antonietti, *Nat. Mater.*, 2009, **8**, 76-80.