

**A novel one-step synthesis of Ce/Mn/Fe mixed metal oxide nanocomposites for oxidative
removal of hydrogen sulfide at room temperature**

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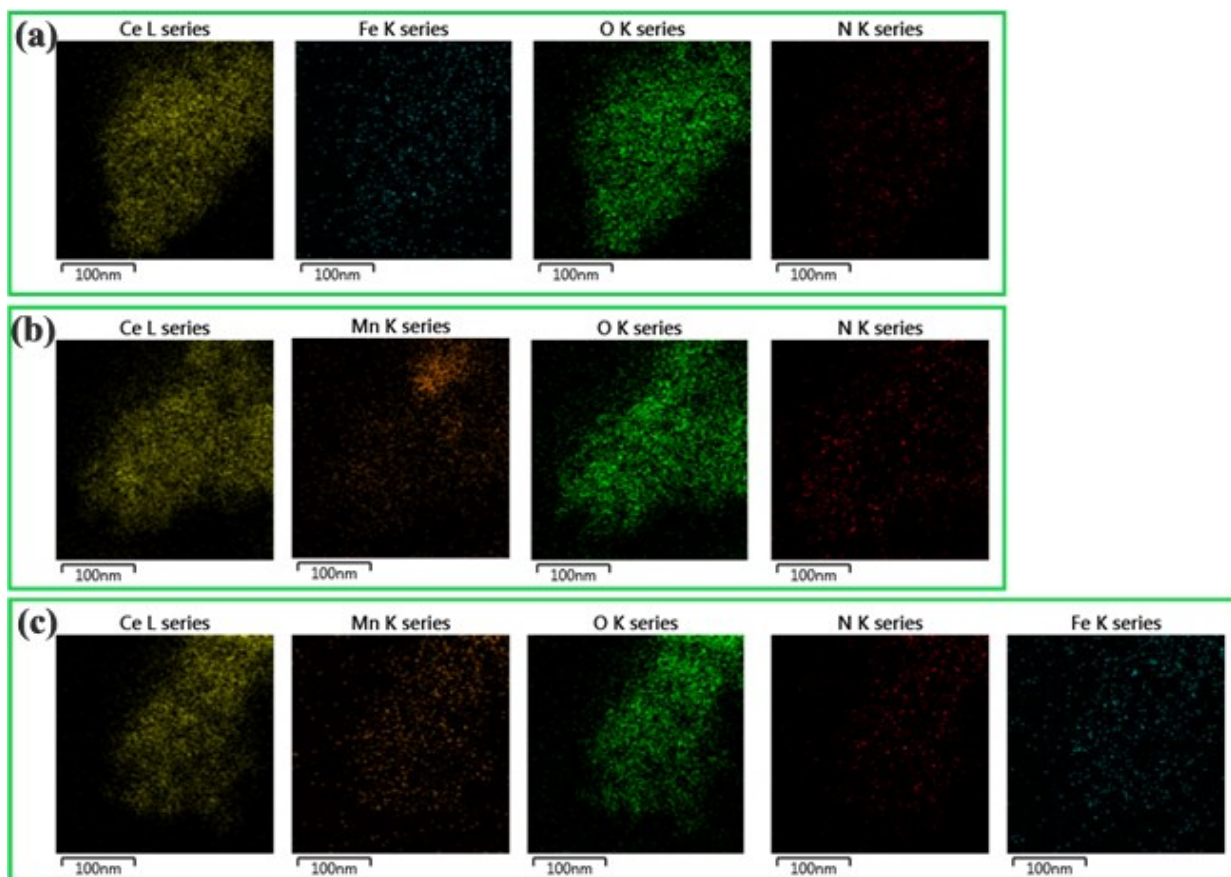


Fig. S1. EDAX elemental mapping of (a) CeFe; (b) CeMn; (c) CeMnFe.

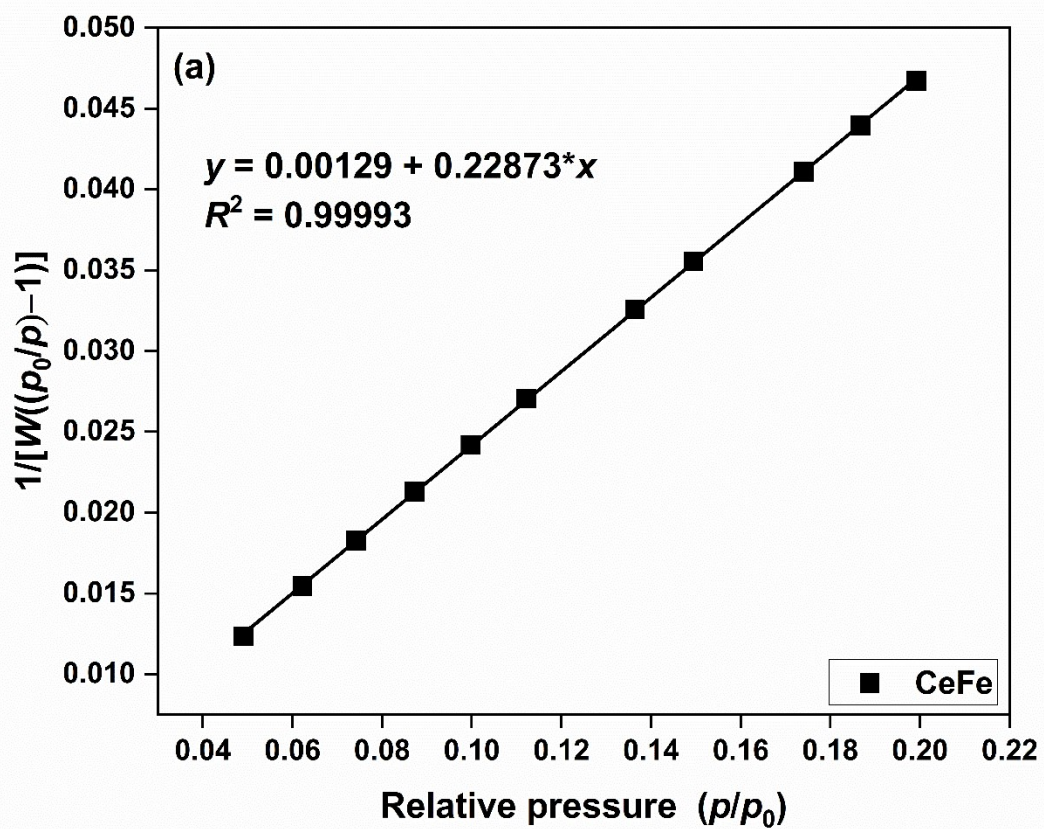


Fig. S2. BET plot of CeFe.

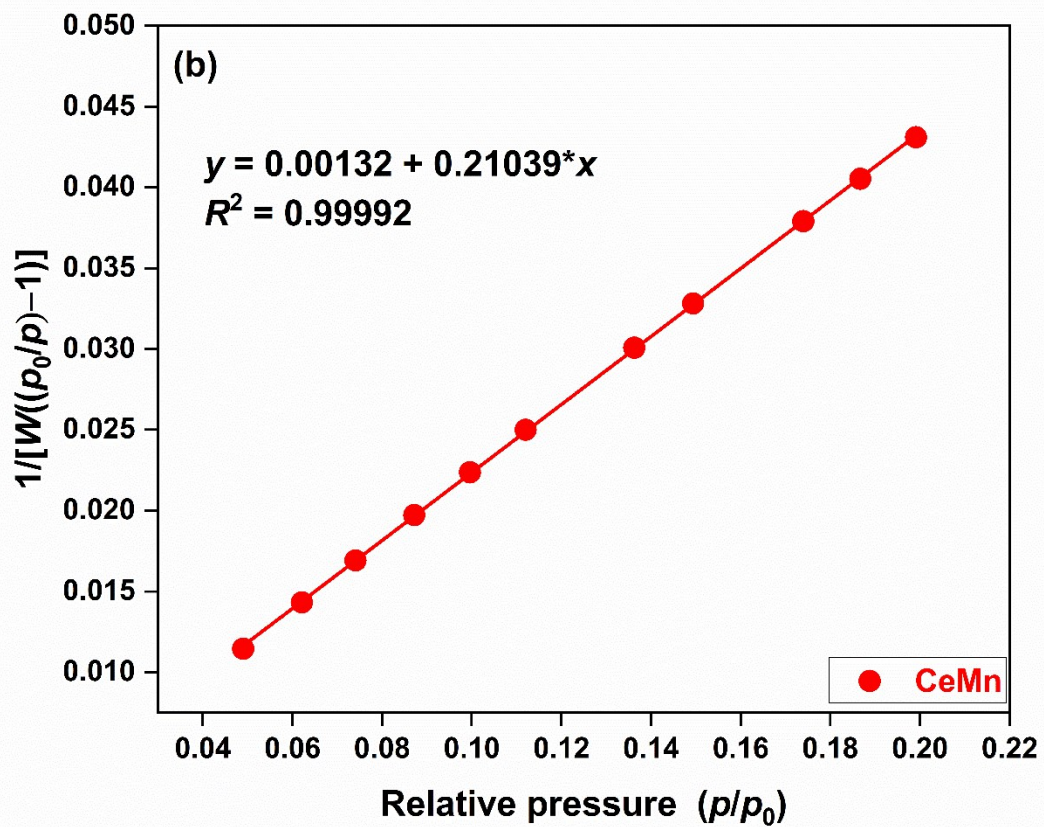


Fig. S3. BET plot of CeMn.

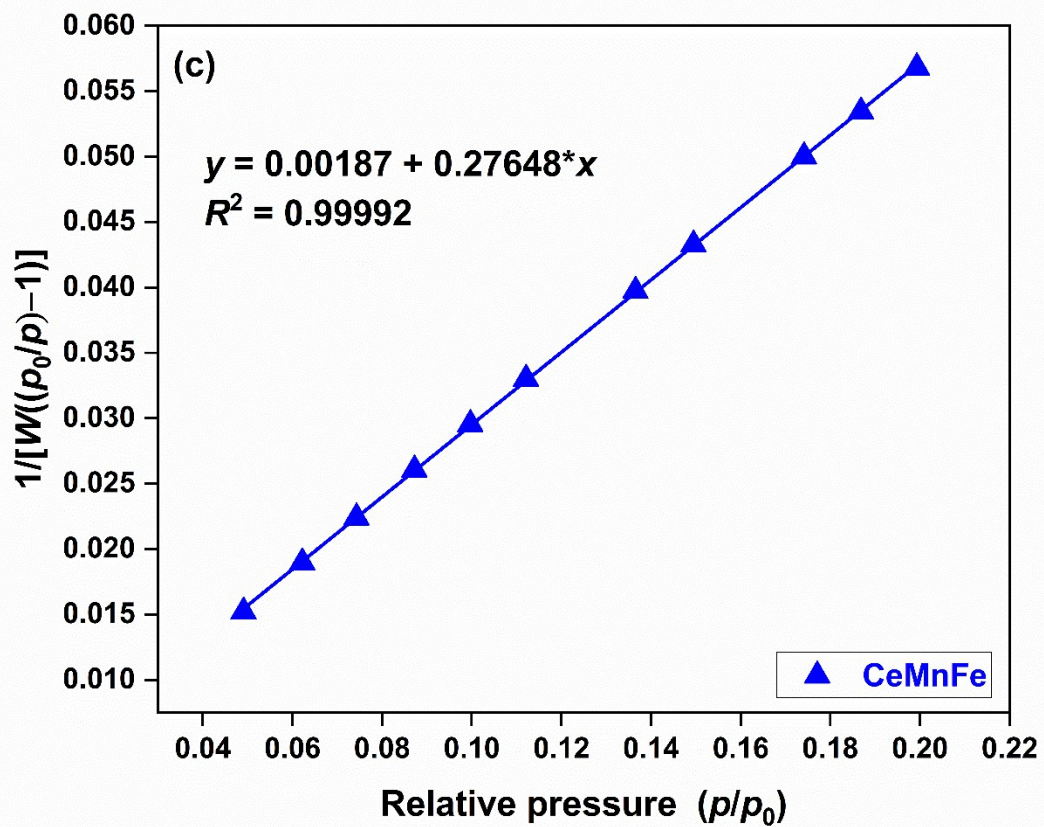


Fig. S4. BET plot of CeMnFe.

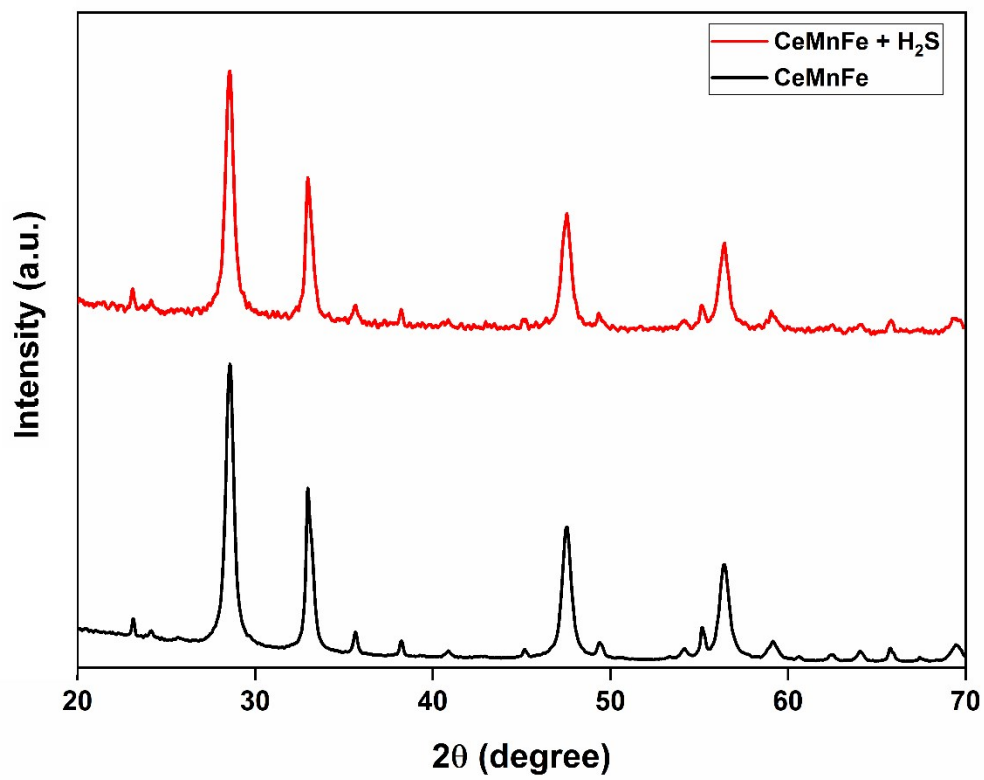


Fig. S5. PXRD pattern of CeMnFe before and after H₂S adsorption.

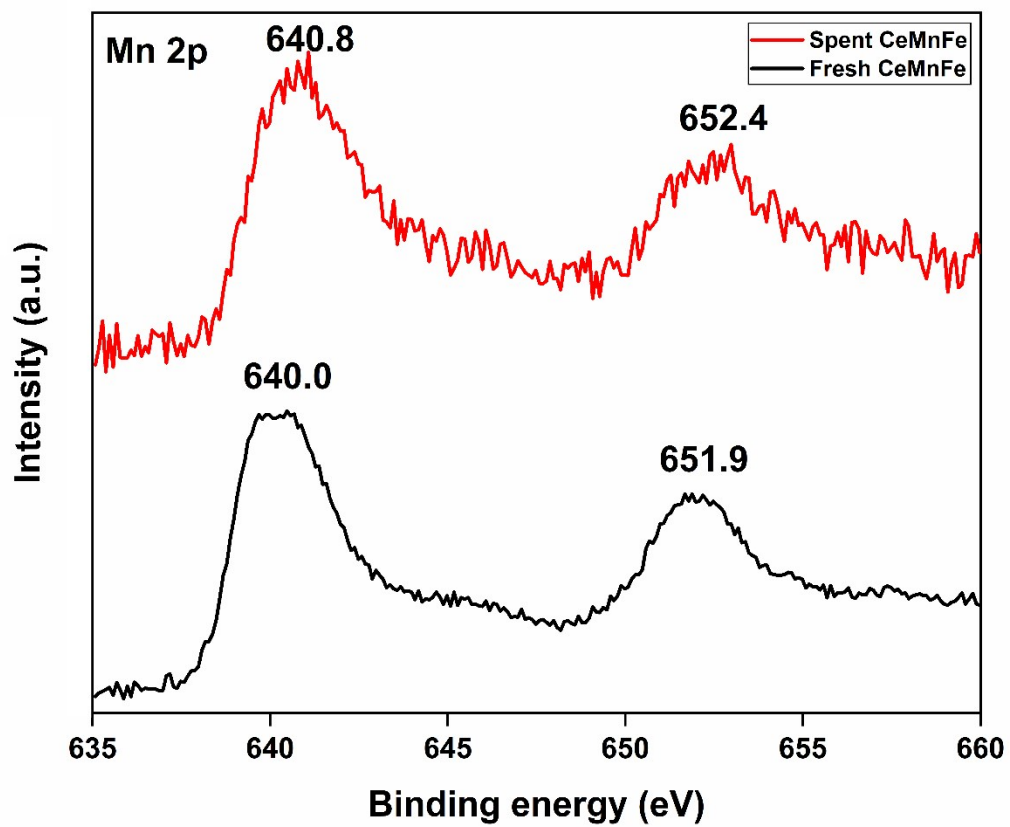


Fig. S6. HRXPS Mn 2p spectra of fresh and spent CeMnFe.

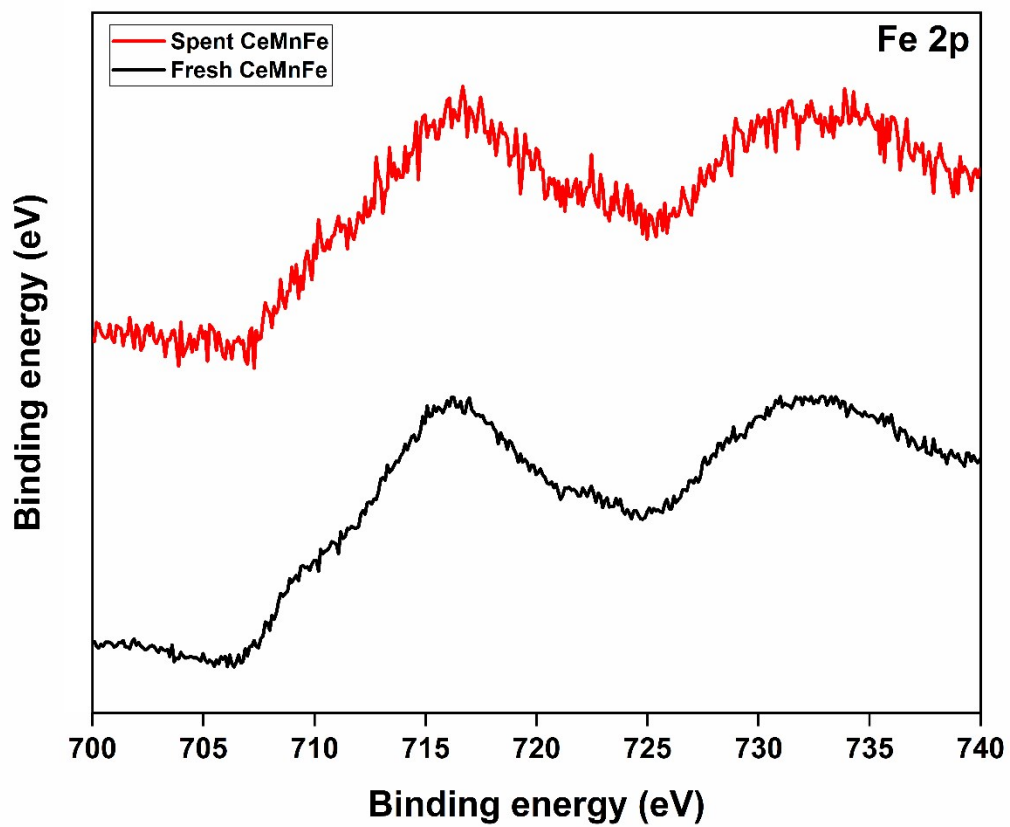


Fig. S7. HRXPS Fe 2p spectra of fresh and spent CeMnFe.

Table S1. The peak-fitting results of O 1s high-resolution signals of mixed metal oxides.

Samples	Assignment	E _B (eV)	FWHM (eV)	At. %
CeFe	O1s O–Ce, O–Fe	530.0	1.2	76.2
	O1s O–H	532.3	1.7	19.1
	O1s water	534.0	1.8	4.7
CeMn	O1s O–Ce, O–Mn	530.0	1.2	79.5
	O1s O–H	532.1	1.8	17.1
	O1s water	533.7	1.9	3.4
Fresh CeMnFe	O1s O–Ce, O–Mn, O–Fe	530.0	1.2	77.4
	O1s O–H	532.3	1.8	19.5
	O1s water	534.1	1.9	3.1
Spent CeMnFe	O1s O–Ce, O–Mn, O–Fe	530.0	1.4	59.9
	O1s O–H	531.6	1.8	28.8
	O1s water	533.3	1.9	11.3

Table S2. The peak-fitting results of Ce 3d high-resolution signals of mixed metal oxides.

Samples	Assignment	E _B (eV)	FWHM (eV)	At. %
CeFe	Ce3d_{5/2} Ce ³⁺	880.2	1.9	9.8
	Ce3d_{5/2} Ce ³⁺	885.5	3.0	18.3
	Ce3d_{5/2} Ce ⁴⁺	881.9	1.5	27.3
	Ce3d_{5/2} Ce ⁴⁺	883.4	2.8	23.0
	Ce3d_{5/2} Ce ⁴⁺	888.7	3.2	21.5

CeMn	Ce3d_{5/2} Ce ³⁺	880.2	1.9	6.8
	Ce3d_{5/2} Ce ³⁺	885.1	3.2	17.3
	Ce3d_{5/2} Ce ⁴⁺	881.8	1.5	25.2
	Ce3d_{5/2} Ce ⁴⁺	882.9	2.6	23.3
	Ce3d_{5/2} Ce ⁴⁺	888.5	3.5	27.3
Fresh CeMnFe	Ce3d_{5/2} Ce ³⁺	880.3	1.9	7.7
	Ce3d_{5/2} Ce ³⁺	885.1	3.2	17.8
	Ce3d_{5/2} Ce ⁴⁺	881.8	1.5	25.7
	Ce3d_{5/2} Ce ⁴⁺	883.0	2.8	23.0
	Ce3d_{5/2} Ce ⁴⁺	888.5	3.5	25.9
Spent CeMnFe	Ce3d_{5/2} Ce ³⁺	880.3	1.9	2.9
	Ce3d_{5/2} Ce ³⁺	886.5	3.0	10.2
	Ce3d_{5/2} Ce ⁴⁺	882.4	1.8	28.7
	Ce3d_{5/2} Ce ⁴⁺	883.9	2.8	28.5
	Ce3d_{5/2} Ce ⁴⁺	889.4	3.5	29.7