Supporting Information

High-yield synthesis of Ce modified Fe-Mn composite oxides benefitting from catalytic destruction of chlorobenzene

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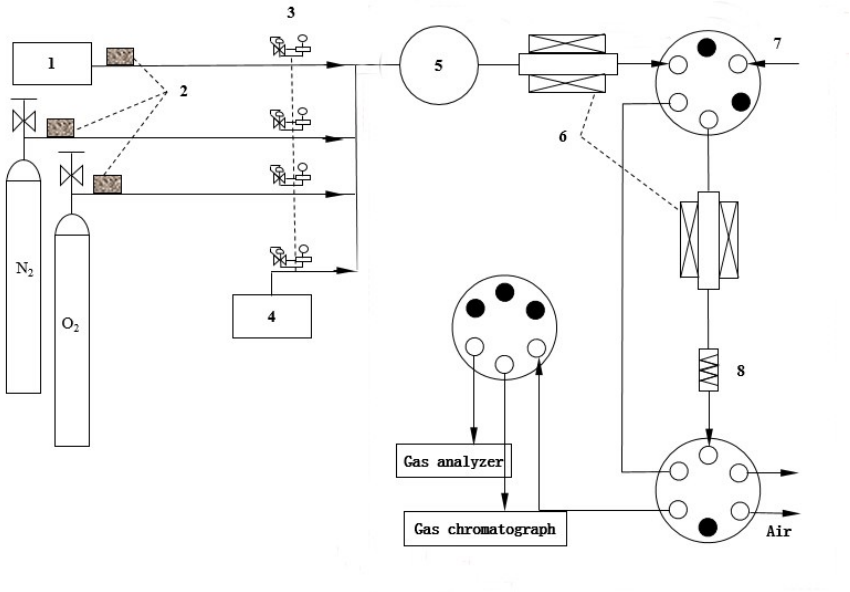
Experimental:

Characterization: Powder X-ray diffraction (XRD) experiments were carried out on a German D8ADVANCE type X-ray powder diffractometer in Germany. The experimental conditions were: Cu-K_a radiation, λ = 0.15406 nm, power 3 kW, scanning range 10 to 80°. The surface area and distribution of pore size were tested by ASAP-2020 surface analyzer from Micromeritics, USA. The sample was pretreated under vacuum condition at 250 ℃ for 2 h. The surface area and distribution of pore size of catalysts were treating in liquid nitrogen conditions under the condition of liquid nitrogen (-196 ℃) with N_2 and He as adsorbent. Pretreatment conditions: 300 ℃, degassing for 6 h at 2.7 Pa. The specific surface area and pore size distribution of the catalyst sample were calculated using the BET curve integral and the BJH equation, respectively. Transmission electron microscopy (TEM) was performed with JEM-2100. The H_2-TPR test was carried out on an N-3000 dual-channel chromatography workstation device. The catalyst was placed in a quartz tube and subjected to H_2 temperature reduction at a rate of 10 ℃/min from 30 ℃ to 830 ℃. X-ray photoelectron spectroscopy was performed on an AXIS ULTRA^{DLD} spectrometer. The catalysts could need to be charged with C 1s binding energy (set to 284.8 eV).

Table S1. experimental conditions

parameter	Parameter value
Carrier particle size / mesh	40-60
Calcination temperature / ℃	300, 400, 500
Reaction temperature / ℃	100,150,200, 250, 300, 350, 400
Smoke simulation / (mL /min)	100
φ(N_2) / %	80
φ(CBz) / %	10
φ(O_2) / %	10
Catalyst volume / g	0.2



1. chlorobenzene generator; 2. drying tank; 3. Rotor flow meter; 4. liquid pump; 5. gas mixing; 6. preheating furnace; 7. protective gas; 8 filter gas;

Fig. S1. Chlorobenzene oxidation reaction device

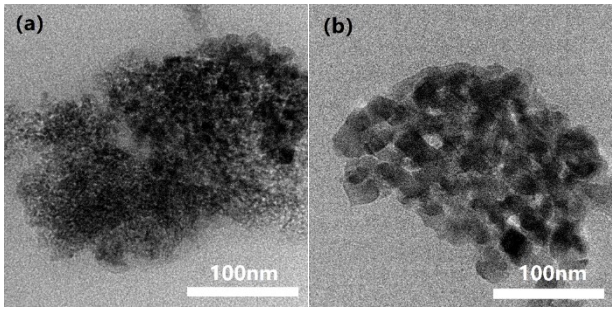


Fig. S2. TEM images of Ce-Fe-Mn-300 (a) and Ce-Fe-Mn-500 (b).

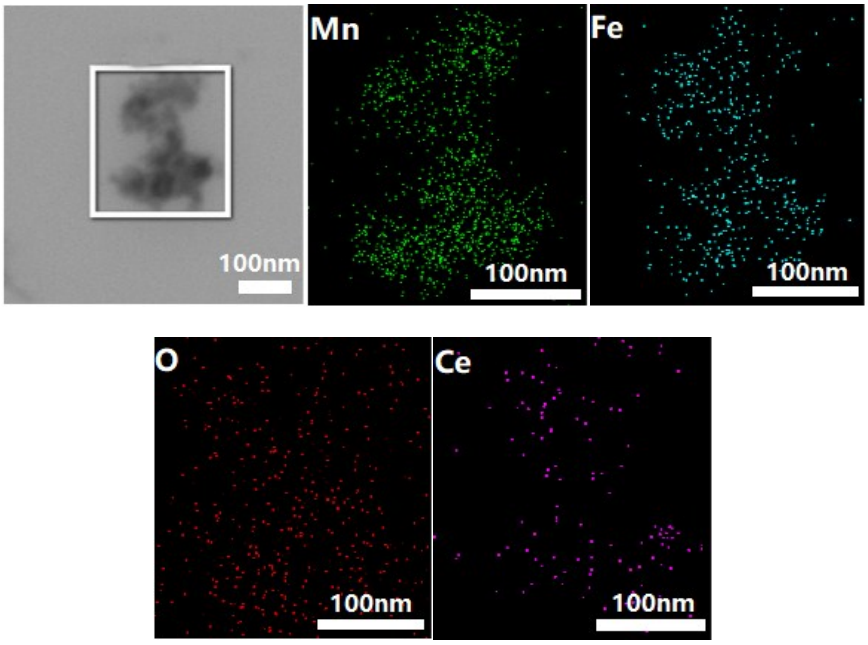


Fig. S3. EDS spectra of Ce-Fe-Mn-400 catalysts