Supporting Information

Manganese-Promoted Fe_3O_4 Microsphere for Efficient Conversion of CO_2 to Light Olefins

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Figures and Tables

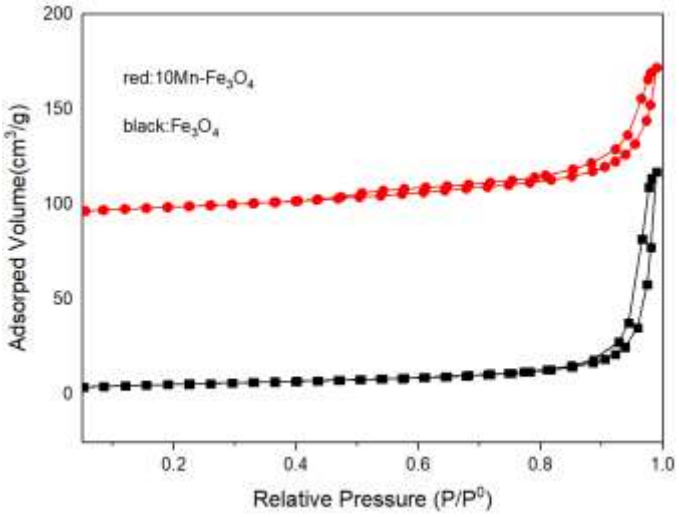

Figure S1. N_2 adsorption-desorption isotherms at 77 K

Table S1. Physicochemical properties of the Fe_3O_4 and 10Mn-Fe_3O_4 catalysts.

Catalyst	BET area (m^2/g)	Pore volume (cm^3/g)	Pore size (nm)
Fe_3O_4	12.3	0.07	35
10Mn-Fe_3O_4	32.9	0.18	36.8

N_2 adsorption-desorption isotherms of the pure Fe_3O_4 and the 10Mn-Fe_3O_4 are shown in Fig. S1. All samples displayed a type IV isotherm with an H1-type hysteresis loop,[1] which was attributed to the agglomeration of nanoparticles (corresponding the result of Figure 1). The BET area of 10Mn-Fe_3O_4 (32.9 m^2/g) was higher than pure Fe_3O_4 (12.3 m^2/g), which indicated the manganese promoter is benefited to increase the specific surface area of Fe_3O_4 microsphere. It implied that Mn-modified Fe_3O_4 has more active sites than pure Fe_3O_4, corresponding to the result of CO_2-TPD.

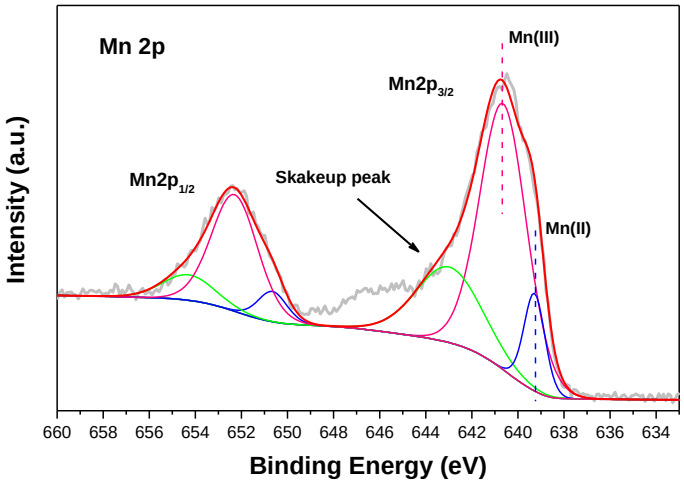

Figure S2. Deconvolution of Mn2p spectrum of reduction 10Mn-Fe_3O_4 catalyst

As Fig. S2 shown, the Mn2p peak of lower binding energy (639.3 eV and 640.8 eV) assigned to Mn(II) and Mn(III) respectively.[2,3] At the same time, the existence of Mn2p satellite feature can also help to identify MnO and Mn_2O_3. This indicated the Mn species was a complex oxide rather than Mn metal in the reduced 10Mn-Fe_3O_4 catalyst.

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