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Design of novel porous Fe_2O_3 cage catalyst for production of gasoline fuels via coupling Fischer-Tropsch with zeolite cracking

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Table S1 Catalytic performances of the cage catalysts.

Time (h)	Mass balance (%)	[a]CO conv.	CO_2 (%)	[b]Product selectivity (wt%)					Products in C_{5+} (%)	
				CH_4	C_2-C_4^0	C_2-$C_4^=$	C_5-C_{11}	C_{12+}	aromatic	i-C_{5+}
24	96.5	86.2	35.3	21.1	17.3	24.2	28.0	9.40	8.39	26.5
48	97.3	82.4	33.5	20.5	16.5	21.7	30.1	11.2	5.80	27.6
72	98.7	83.5	37.2	22.4	18.2	21.9	27.1	10.4	4.95	27.2

[a]CO conversion: $(CO_{syngas}\text{-}CO_{tailgas})/CO_{syngas} \times 100\%$, CO_{syngas} and $CO_{tailgas}$ represent the moles of CO at the syngas and tailgas, respectively.

[b]Product selectivity: $Wn/\sum Wn \times 100\%$, Wn represents the weight of hydrocarbons at the carbon number of n, including gaseous and liquid hydrocarbons.

Table S2 FTS performances of the prepared catalysts after FTS for 24 h.

Sample	Mass balance	[a]CO conv. (%)	[b]CO_2 (%)	[c]Product selectivity (wt%)					Products in C_{5+} (%)	
				CH_4	C_2-C_4^0	C_2-$C_4^=$	C_5-C_{11}	C_{12+}	aromatic	i-C_{5+}
Fe+ZSM5 (16)	96.6	69.9	32.6	14.7	10.2	22.3	49.4	3.40	7.34	63.3
Fe+ZSM5 (24)	96.4	75.3	40.0	16.4	12.3	4.41	64.8	2.09	24.6	42.8
1Fe+ZSM5 (27)	97.2	69.9	26.6	20.8	11.6	3.86	58.6	5.04	34.8	34.1
Fe+ZSM5 (27)	97.4	93.6	43.6	18.6	13.7	3.09	62.7	1.91	22.1	48.8
2Fe+ZSM5 (27)	97.1	74.1	32.1	21.4	13.0	3.30	60.0	2.30	36.9	35.7
Fe+ZSM5 (33)	96.6	84.6	38.7	15.3	11.1	5.52	65.1	2.98	15.7	57.0
Fe+ZSM5 (40)	96.4	91.6	41.4	21.1	15.0	3.80	55.8	4.30	21.3	51.5

[a]CO conversion: $(CO_{syngas}\text{-}CO_{tailgas})/CO_{syngas} \times 100\%$, CO_{syngas} and $CO_{tailgas}$ represent the moles of CO at the syngas and tailgas, respectively.

[b]CO_2 selectivity: $(n_{tailgas}\ mol \times CO_{2tailgas}\ mol\%)/(\ n_{syngas}\ mol \times CO_{syngas}\ mol\% - n_{tailgas}\ mol \times CO_{tailgas}\ mol\%) \times 100\%$

[c]Product selectivity: $W_n/\sum W_n \times 100\%$, W_n represents the weight of hydrocarbons at the carbon number of n, including gaseous and liquid hydrocarbons.

Table S3 Catalytic performance of the prepared catalysts.

Catalysts	C_{2+} paraffins (wt%)	C_{2+} olefins (wt%)	Naphthene in C_{5+} (%)	Aromatics in C_{5+} (%)	Olefins/ Paraffins	Si (10^{-3} mol)	Al (10^{-3} mol)	Si/Al
Fe	31.4	41.1	3.20	8.39	1.31	0	0	0
Fe+ ZSM5(16)	20.6	56.9	16.9	7.34	2.77	9.79	0.60	16
Fe+ ZSM5(24)	32.3	22.0	21.8	24.6	0.68	9.21	0.38	24
Fe+ ZSM5(27)	32.2	25.4	17.1	22.1	0.79	8.06	0.30	27
Fe+ ZSM5(33)	33.3	30.5	17.9	15.7	0.92	9.89	0.30	33
Fe+ ZSM5(40)	31.5	23.9	20.0	21.3	0.76	8.34	0.21	40

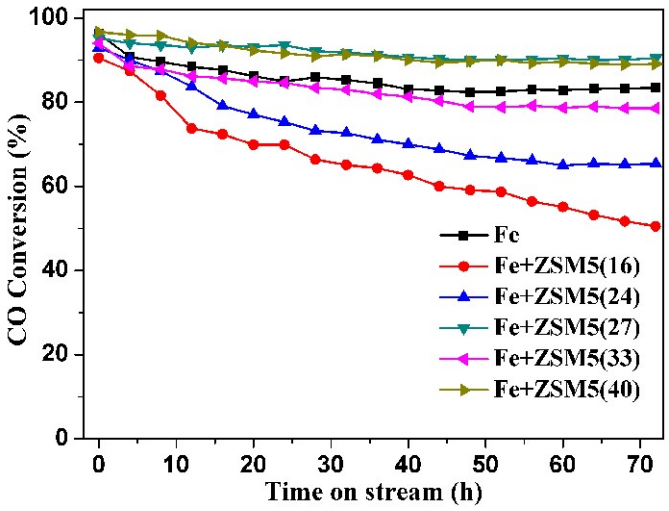

Fig. S1 CO conversion with time on stream over the as-prepared catalysts.