Supporting Information

Histogram Calculations

Figure S1a depicts a representative TEM micrograph, where the size of the spherical particles was measured as follows (Figure S1b), and the histogram for the particle size distribution of the obtained γ-Fe_2O_3@C@MoO_3 NPs (Figure1f) can be derived from measurements of more than 400 particles from a large number of TEM images(12).

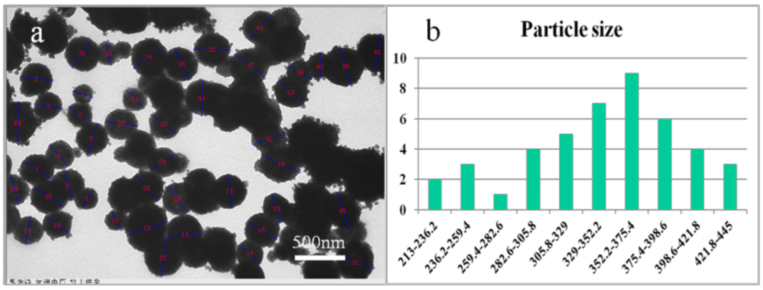
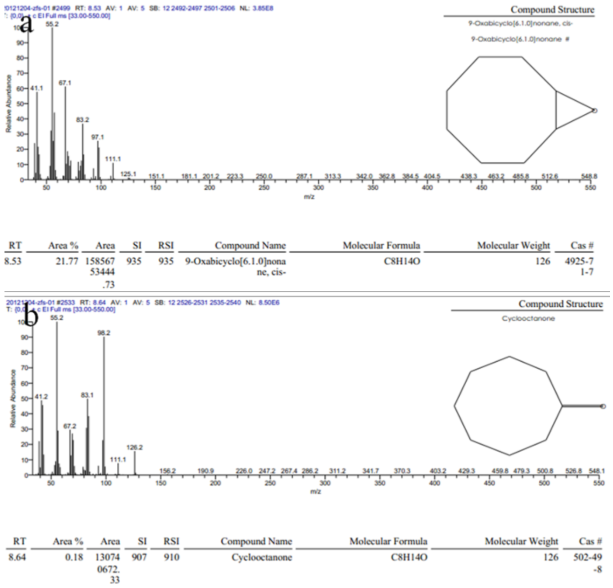


Figure S1 Representative TEM image of the obtained γ-Fe_2O_3@C@MoO_3 NPs with a histogram of particle size distribution.

Analysis of synthesized compounds.

The analysis showed that cyclooctene oxide, instead of cyclooctanone, is the major product in this reaction indicating that at the presence of catalyst, cyclooctene was subject to epoxidation as well, which was confirmed by analysis of reactants and products through GC-MS.



RT	Area %	Area	SI	RSI	Compound Name	Molecular Formula	Molecular Weight	Cas #
8.53	21.77	15856753444.73	935	935	9-Oxabicyclo[6.1.0]nonane, cis-	C8H14O	126	4925-71-7

RT	Area %	Area	SI	RSI	Compound Name	Molecular Formula	Molecular Weight	Cas #
8.64	0.18	130740672.33	907	910	Cyclooctanone	C8H14O	126	502-49-8

Figure S2 Mass spectra of a)cyclooctene oxide and b)cyclooctanone.

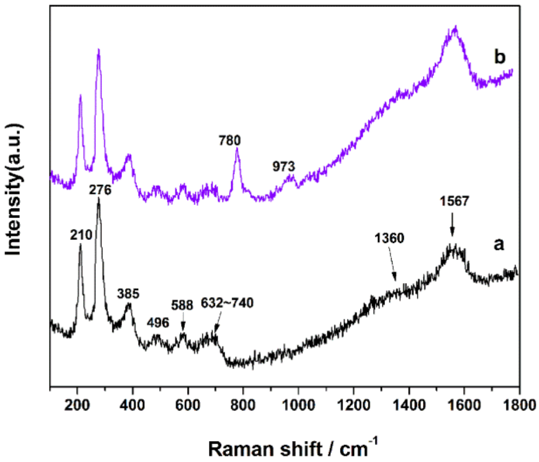
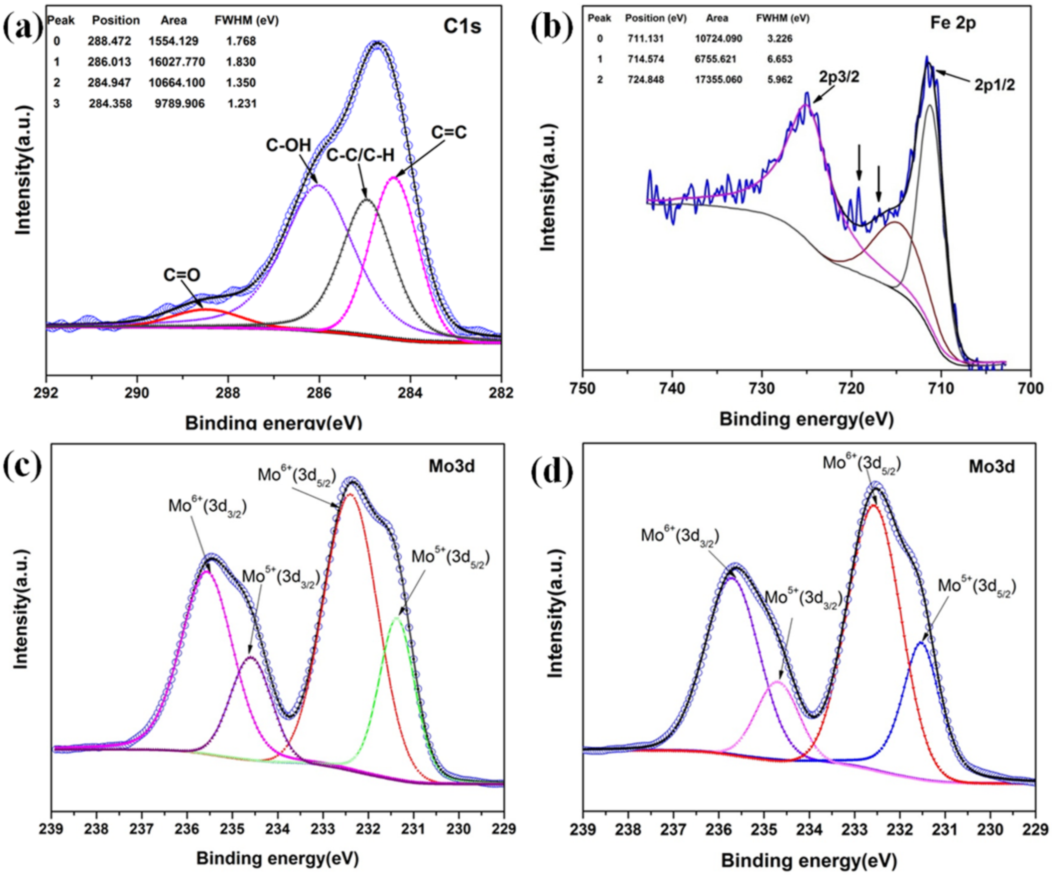


Figure S3 Raman spectra of a) γ-Fe_2O_3@C, b) γ-Fe_2O_3@C@MoO_3. The characteristic peaks of carbon were detected at 1360 cm^{-1} (D-band) and 1567 cm^{-1} (G-band). Here, these two vibrational peaks are broad, which indicates the poor crystallinity in the as-formed state, similar to amorphous carbon.[1] The stretching frequency at 210 and 385 cm^{-1}, are attributed to the characteristic peaks of α-Fe_2O_3.[2] Meanwhile, the characteristic peaks of Fe_3O_4 at 276, 588, and 668 cm^{-1}, assigned, respectively, to the E_g, T_{2g} and A_{1g} vibrational modes, were also observed, probably resulting from the fact that γ-Fe_2O_3 can be partially reduced to Fe_3O_4 during the coating process.[3] In Figure S3b, the peaks at 973 and 780 cm^{-1} are assigned to the stretching mode band of the terminal Mo=O groups and the intermediate bridging O–Mo–O bonds, respectively, which is lower than the literature peak value at 994 and 817 cm^{-1}.The large shift might be caused by the strain relaxation of the rolling up of the MoO_3 layers.[4]



Peak	Position	Area	FWHM (eV)
0	288.472	1554.129	1.768
1	286.013	16027.770	1.830
2	284.947	10664.100	1.350
3	284.358	9789.906	1.231

Peak	Position (eV)	Area	FWHM (eV)
0	711.131	10724.090	3.226
1	714.574	6755.621	6.653
2	724.848	17355.060	5.962

Figure S4 High-resolution XPS spectrum of as-prepared γ-Fe_2O_3@C@MoO_3 core/shell NPs: a) C 1s, b) Fe 2p, c) Mo 3d, d) Mo 3d for the cyclooctene adsorbed γ-Fe_2O_3@C@MoO_3

Table.S1 Mo3d spectral fitting parameters: binding energy, percentage of total area

catalyst[1]	Eb($3d_{5/2}$)/ eV		Eb($3d_{3/2}$)/ eV		Peak area ratios[2]	
	Mo^{5+}	Mo^{6+}	Mo^{5+}	Mo^{6+}	Mo^{5+}	Mo^{6+}
a	231.37	232.39	234.58	235.55	29.7	70.3
b	231.53	232.56	234.70	235.70	31.0	69.0

[1] a– γ-Fe_2O_3@C@MoO_3, b–the cyclooctene adsorbed γ-Fe_2O_3@C@MoO_3.

[2] Sum of 5^+ and 6^+ areas is 100.

References

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