

Electronic Supplementary Information

One-pot redox synthesis of Pt/Fe₃O₄ catalyst for efficiently chemoselective hydrogenation of cinnamaldehyde

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Tables**Table S1** The binding energy and fraction of Pt species for Pt/Fe₃O₄(100) catalyst

Sample	Pt ⁰ binding energy (eV)		Pt ²⁺ binding energy (eV)		Pt ²⁺ fraction (%)
	4f _{7/2}	4f _{5/2}	4f _{7/2}	4f _{5/2}	
fresh	71.3	74.6	72.2	75.3	28.5
used	71.3	74.6	72.1	75.4	33.7

Table S2 Previous literatures for the chemoselective hydrogenation of CAL to COL over Pt-based supported catalysts

Entry	Catalysts	Reaction conditions	Conv. (%)	Sel. (%)	Refs.
1	Pt/CeO ₂ -ZrO ₂ +NaOH	RT, 20 bar H ₂ , 2 h	42.3	97.3	1
2	Pt@UiO-66-NH ₂	298 K, 40 bar H ₂ , 42 h	85.9	87.9	2
3	Pt/MesoTiO ₂ -SiO ₂ -M	353 K, 40 bar H ₂ , 0.5 h	98.8	90.9	3
4	MIL-101(Cr)@Pt@MIL-101(Fe) ^{2,9}	RT, 30 bar H ₂ , 20 h	99.8	95.6	4
5	Pt/MIL-100@MIL-100	298 K, 1.01 bar H ₂ , 4 h	95.0	96.0	5
6	Pt/ZnFe-LDH	333 K, 20 bar H ₂ , 2 h	95.1	91.0	6
7	PtCo/N-CNT	343 K, 20 bar H ₂ , 1.5 h	99.7	87.9	7
8	Pt/CoAl-LDH	343 K, 20 bar H ₂ , 2 h	94.3	74.2	8
9	Co-Pt/SiO ₂	353 K, 40 bar H ₂ , 2 h	28.6	78.0	9
10	Pt/Fe ₃ O ₄ (100)	303 K, 5 bar H ₂ , 2.5 h	94.2	92.2	This study

References

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Table S3 Effect of concentration of substrate on catalytic performance over Pt/Fe₃O₄(100) catalyst. Reaction conditions: 303 K, 5 bar H₂, 120 min, 5 ml 2-propanol used as solvent

Entry	CAL concentration (mol L ⁻¹)	CAL conv. (%)	COL sel. (%)	HCAL sel. (%)	HCOL sel. (%)
1	0.032	94.2	92.9	3.9	3.2
2	0.079	66.2	92.5	3.2	4.3
3	0.16	47.8	92.3	3.7	4.0
4	0.32	25.9	90.6	4.3	5.1
5	0.79	23.5	92.4	4.2	3.4

Table S4 Effect of stirring speed on catalytic performance over Pt/Fe₃O₄(100) catalyst. Reaction conditions: 303 K, 5 bar H₂, 10 min, 5 ml 2-propanol used as solvent

Entry	Stirring speed (rpm)	CAL conv. (%)	COL sel. (%)	HCAL sel. (%)	HCOL sel. (%)
1	200	15.6	87.4	12.6	5.4
2	530	37.9	92.4	4.4	3.2
3	750	36.1	93.1	3.4	3.5
4	1000	35.9	92.3	4.0	3.7

Figures

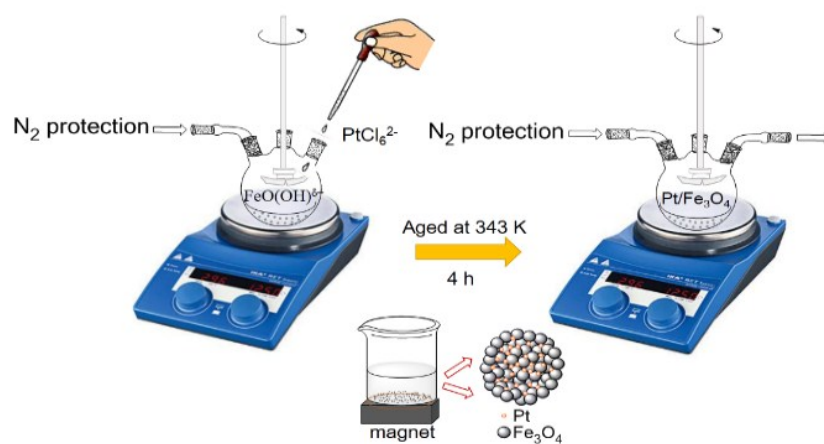


Fig. S1 Synthesis procedure of Pt/Fe₃O₄ catalysts with a facile redox reaction.

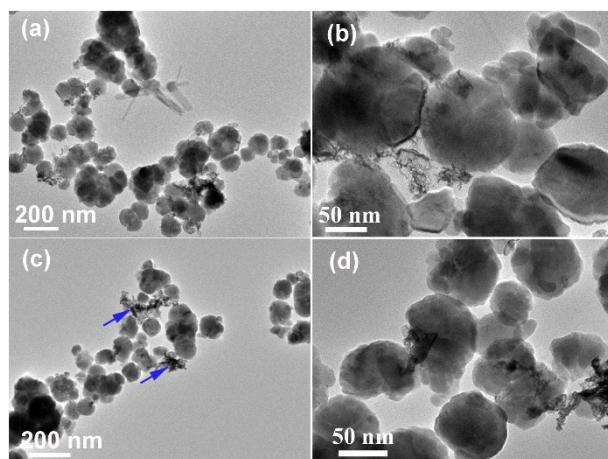


Fig. S2 TEM and HRTEM images: (a-b) Pt/Fe₃O₄(200) catalyst; (c-d) Pt/Fe₃O₄(50) catalyst.

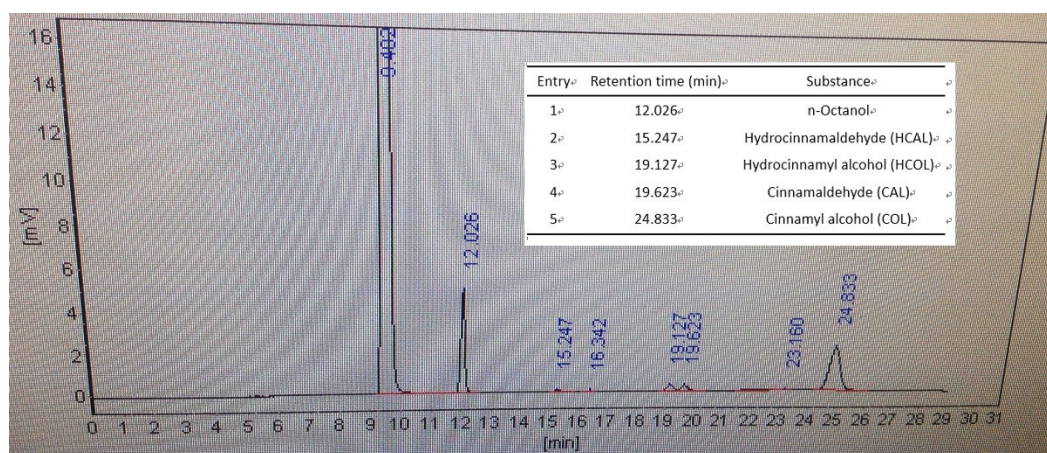


Fig. S3 The GC spectrum of products over Pt/Fe₃O₄(100) catalyst for the hydrogenation of CAL.

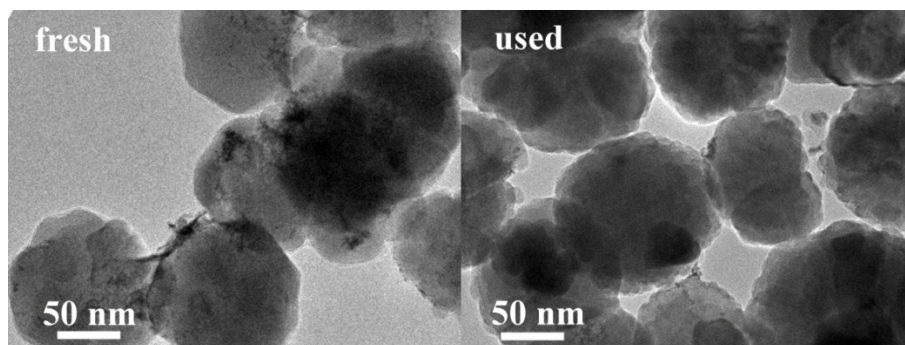


Fig. S4 TEM images of fresh and used Pt/Fe₃O₄(100) catalyst.