

## Supplementary material

# Catalytic Behaviors of Combined Oxides Derived from Mg/Al<sub>x</sub>Fe<sub>1-x</sub>-Cl Layered Double Hydroxides for H<sub>2</sub>S Selective Oxidation

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This Supporting Information includes:

Table S1

Table S1 XPS analysis of prepared catalysts

Sample	Mg (At %)	Cl (At%)	Na (At%)	Al (At %)	Fe (At %)	S (At %)	Fe/(Al+Fe) (molar ratio)
Mg <sub>2</sub> Al <sub>0.8</sub> Fe <sub>0.2</sub> O	16.4	0.5	0.9	9.6	1.2	-	0.1
Mg <sub>2</sub> Al <sub>0.6</sub> Fe <sub>0.4</sub> O	15.6	0.4	1.3	8.8	2.3	-	0.2
Mg <sub>2</sub> Al <sub>0.4</sub> Fe <sub>0.6</sub> O	15.8	0.5	4.5	5.7	2.9	-	0.3
Mg <sub>2</sub> Al <sub>0.2</sub> Fe <sub>0.8</sub> O	16.9	0.2	0.5	4.1	8.3	-	0.7
Used Mg <sub>2</sub> Al <sub>0.6</sub> Fe <sub>0.4</sub> O	16.2	0.1	0.8	8.1	1.9	4.9	0.2

Figures S1-S9.

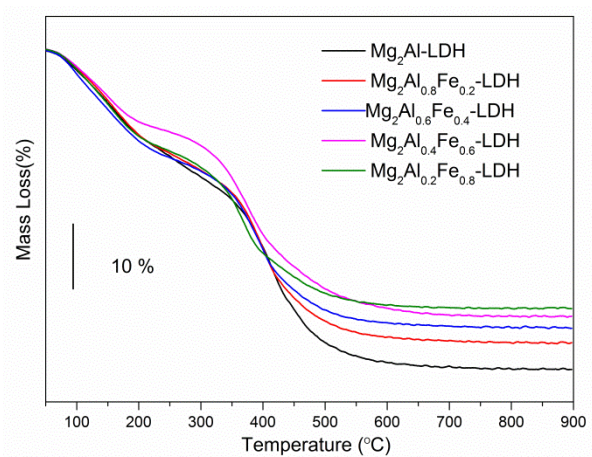


Fig. S1 TG patterns of Mg<sub>2</sub>Al<sub>x</sub>Fe<sub>1-x</sub>-LDH

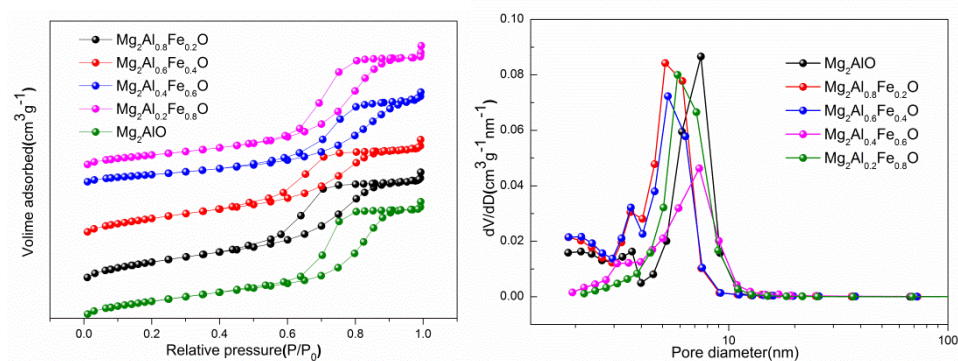


Fig. S2 Nitrogen adsorption/desorption isotherms and pore size distribution calculated from the desorption branch of Mg<sub>2</sub>Al<sub>x</sub>Fe<sub>1-x</sub>O catalysts

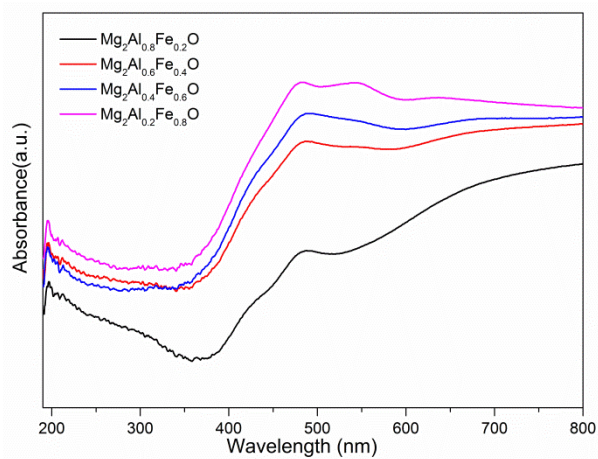


Fig. S3 Uv-vis-DRS patterns of  $Mg_2Al_xFe_{1-x}O$  catalysts

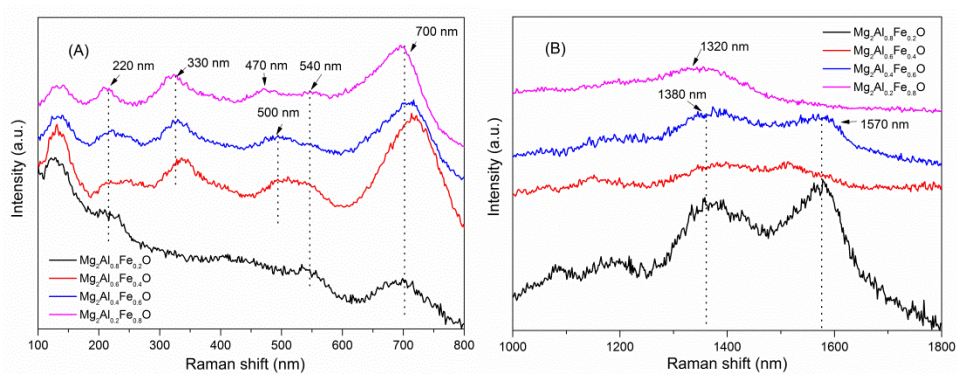


Fig. S4 Raman patterns of  $Mg_2Al_xFe_{1-x}O$  catalysts

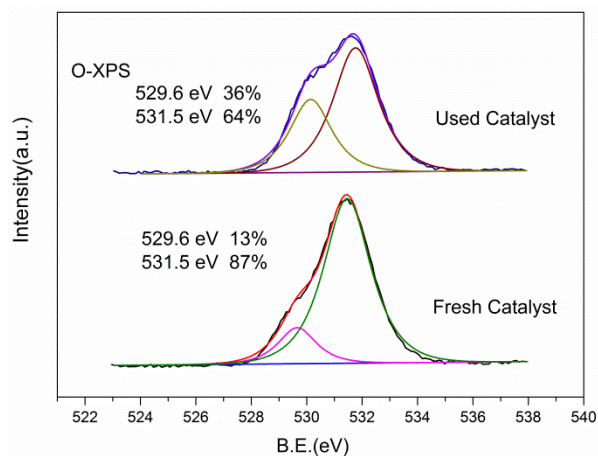


Fig. S5 O-XPS patterns of  $\text{Mg}_2\text{Al}_{0.6}\text{Fe}_{0.4}\text{O}$  catalysts

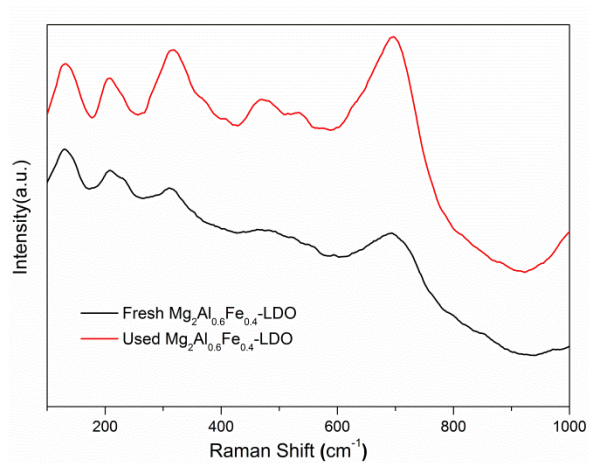


Fig.S6 Raman patterns of fresh and used  $\text{Mg}_2\text{Al}_{0.6}\text{Fe}_{0.4}\text{O}$  catalyst

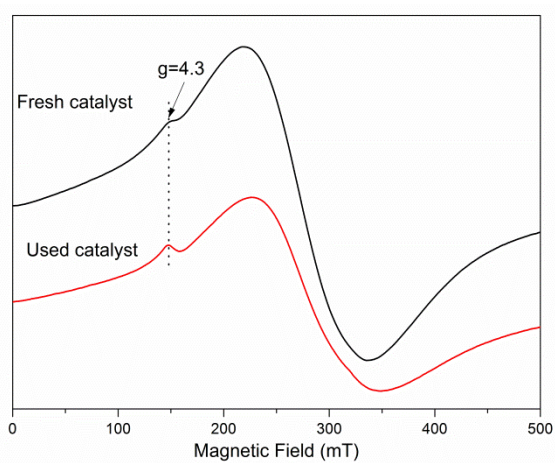


Fig.S7 EPR patterns of fresh and used  $\text{Mg}_2\text{Al}_{0.6}\text{Fe}_{0.4}\text{O}$  catalyst

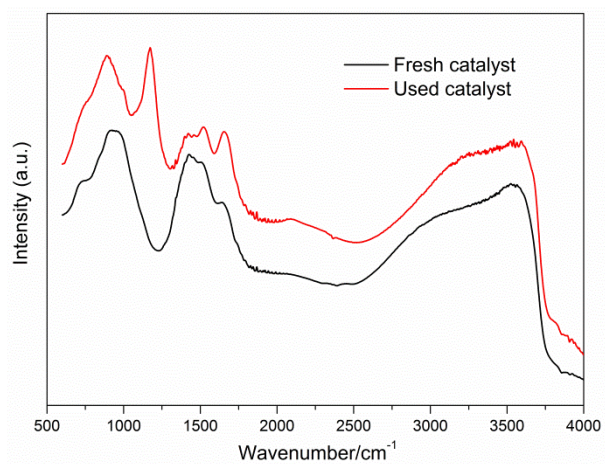


Fig. S8 FTIR patterns of  $\text{Mg}_2\text{Al}_{0.6}\text{Fe}_{0.4}\text{O}$  catalysts

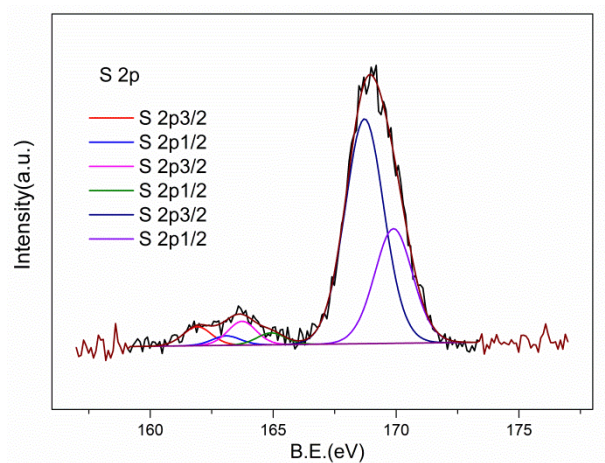


Fig. S9 S 2p XPS spectrum of  $\text{Mg}_2\text{Al}_{0.6}\text{Fe}_{0.4}\text{O}$  catalysts