Supporting Information

Synthesis of renewable C-C cyclic oxygenated compounds dedicated for high-density biofuels from biomass-derived cyclopentanone

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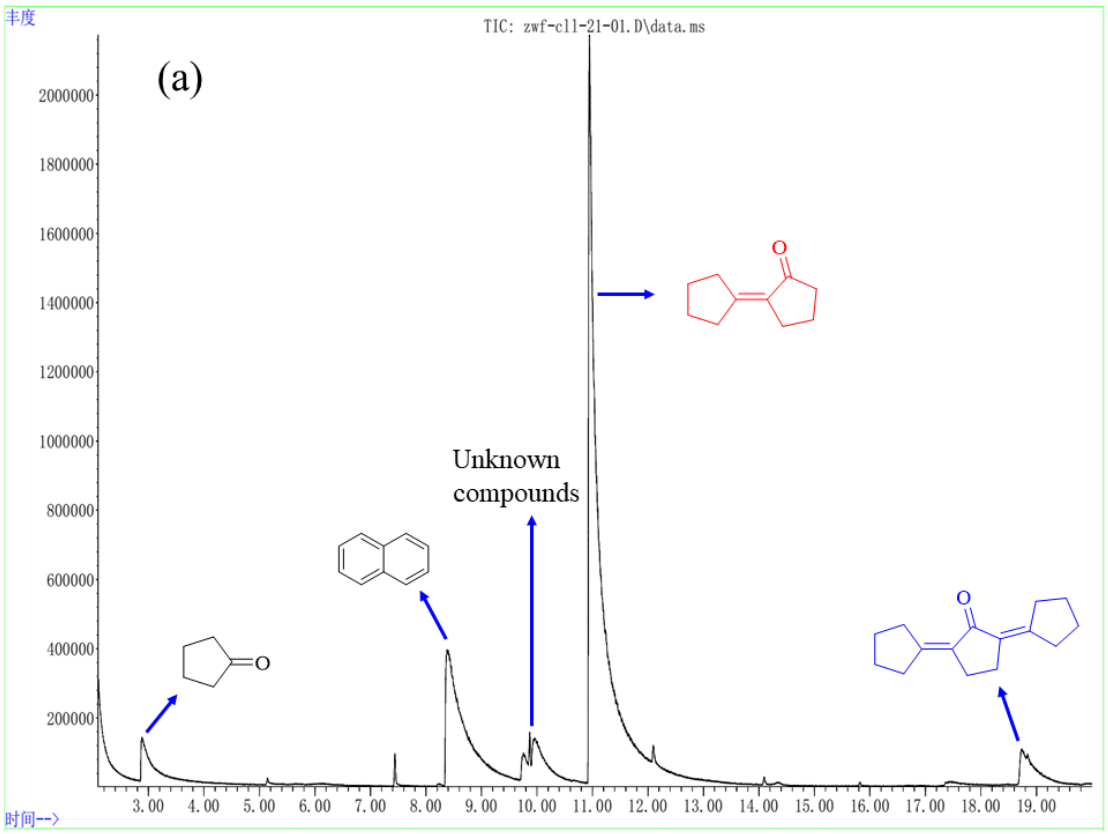
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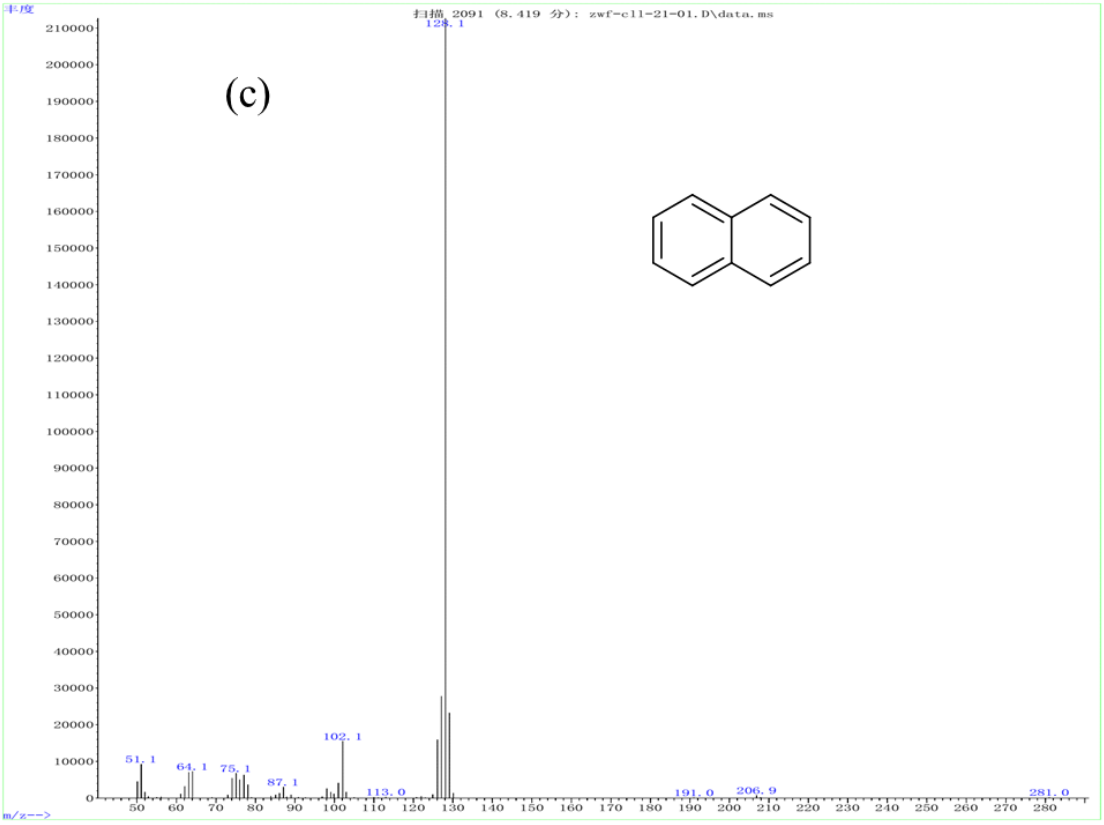
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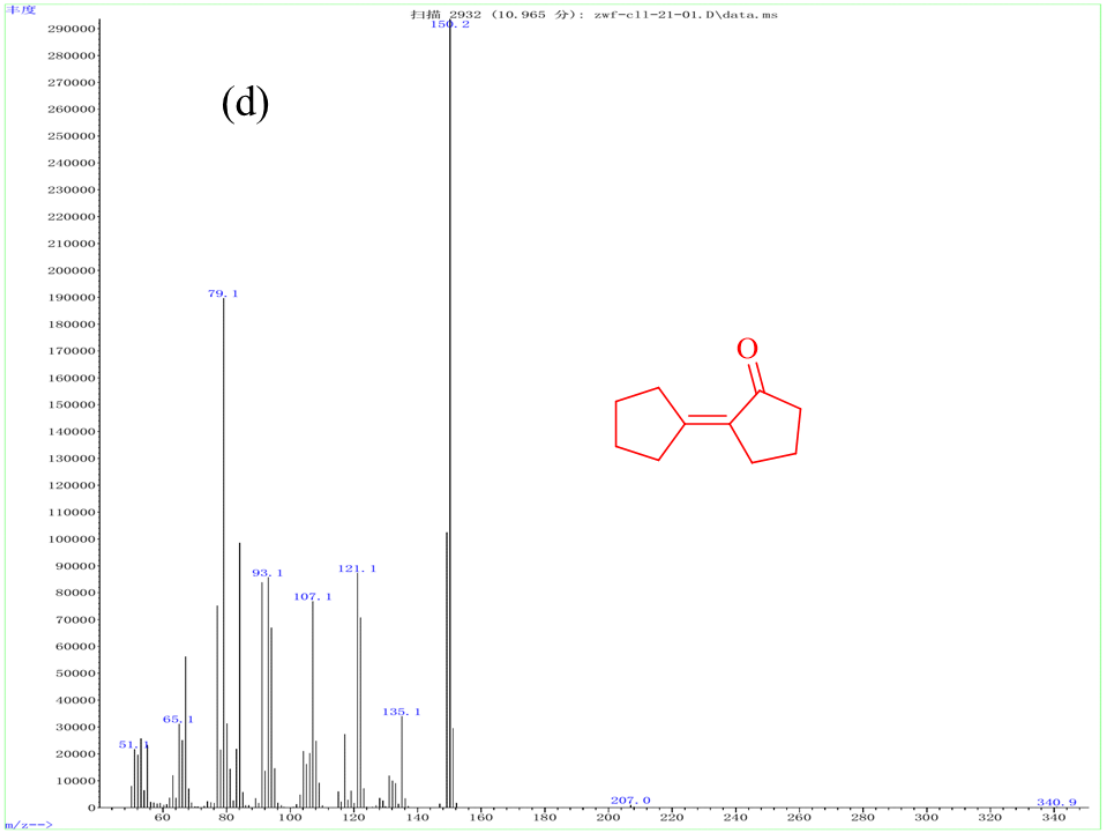
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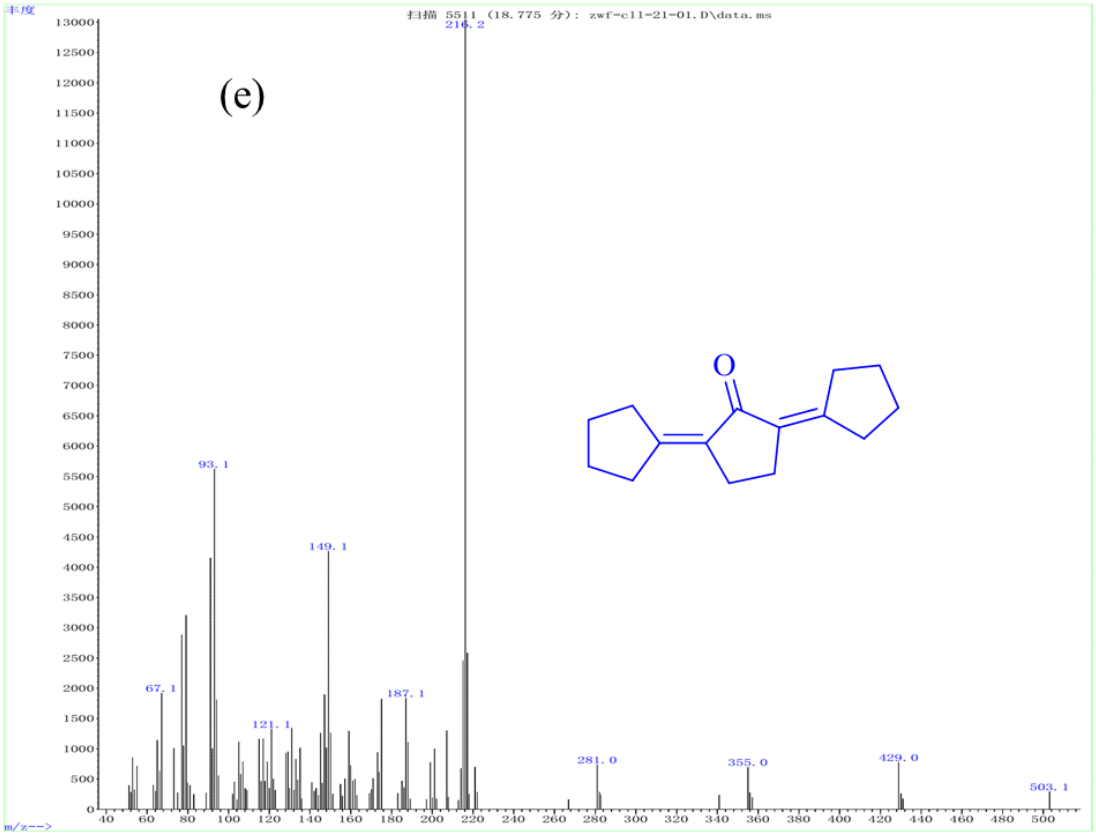

Figure S1 GC chromatograms of reaction mixture (from GC-MS) catalyzed by $4MgCO_3 \cdot Mg(OH)_2 \cdot 4H_2O$ at 180 °C.

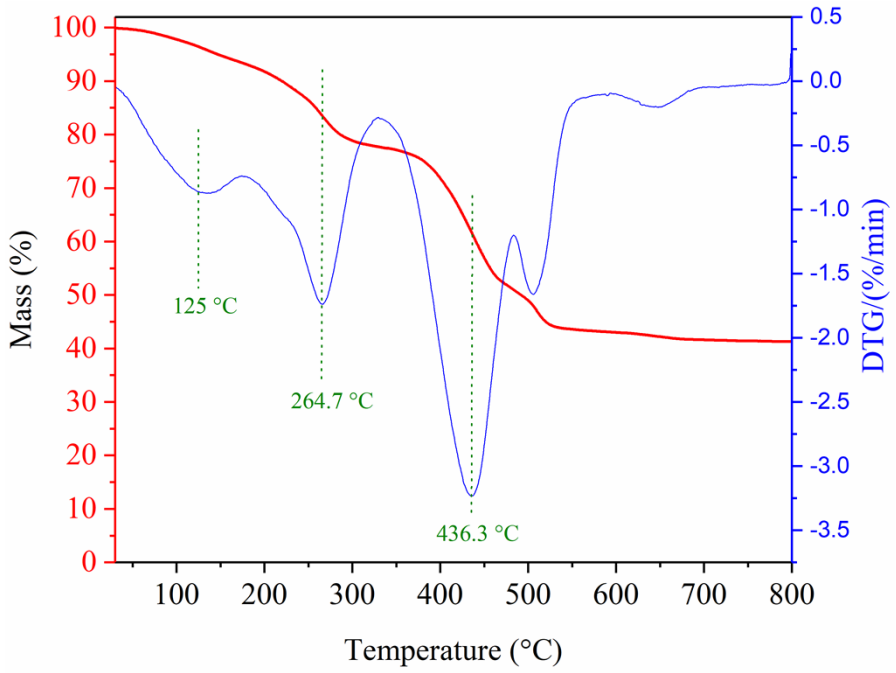

Figure S2 TGA and DTG curves of $4MgCO_3 \cdot Mg(OH)_2 \cdot 4H_2O$ catalyst

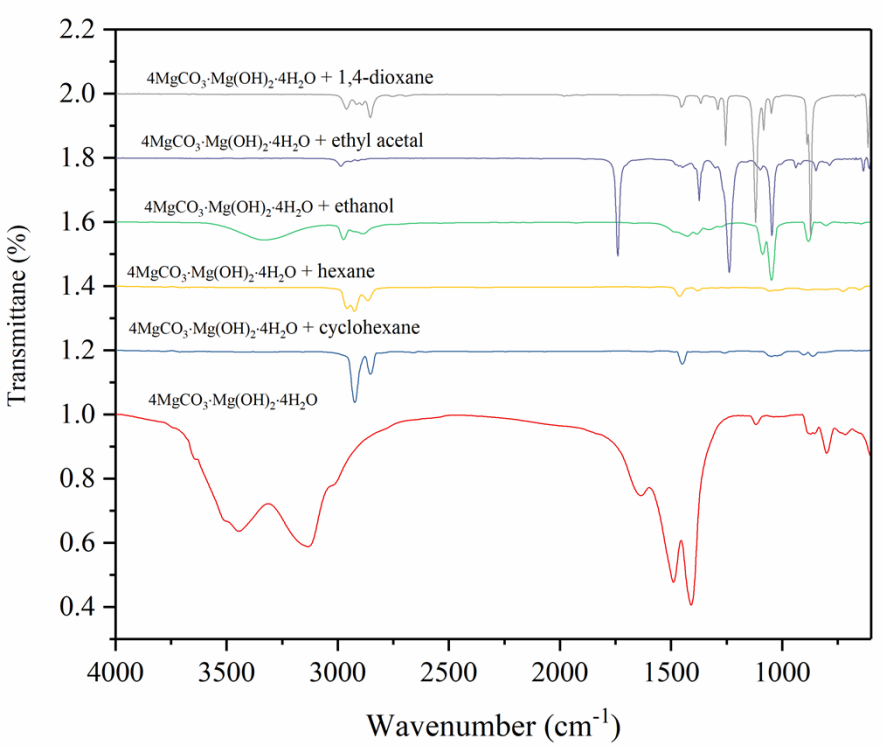

Figure S3 FT-IR spectra of basic magnesium carbonate/reaction solvents

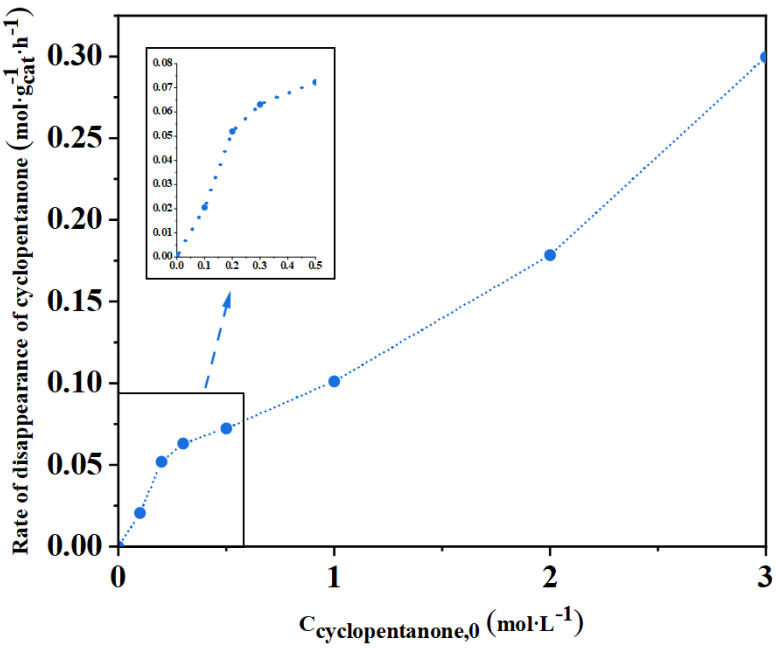

Figure S4 Initial rates of cyclopentanone conversion over $4MgCO_3 \cdot Mg(OH)_2 \cdot 4H_2O$ catalyst as a plot of initial cyclopentanone concentration. Reaction condition: 0.05 g $4MgCO_3 \cdot Mg(OH)_2 \cdot 4H_2O$, 10 mL of total liquid volume, 120 °C and 0.5 h

Table S1 Linearization of cyclopentanone self-condensation initial rates derived from Langmuir-Hinshelwood and Eley-Rideal reaction models

Model	Initial rate expression	Linearized function
Langmuir-Hinshelwood Deprotonation	$r = k_{DP}\frac{K_{ads}C}{1 + K_{ads}C}$	$\frac{1}{r} = \frac{1}{k_{DP}K_{ads}}\frac{1}{C} + \frac{1}{k_{DP}}$
Langmuir-Hinshelwood C-C coupling	$r = k_{LH}K_{DP}\left(\frac{K_{ads}C}{1 + K_{ads}C + K_{ads}K_{DP}C}\right)^2$	$\frac{1}{\sqrt{r}} = \frac{1}{K_{ads}\sqrt{k_{LH}K_{DP}}}\frac{1}{C} + \frac{1 + k_{DP}}{\sqrt{k_{LH}K_{DP}}}$
Eley-Rideal C-C coupling	$r = k_{ER}K_{DP}\frac{K_{ads}C}{1 + K_{ads}C + K_{ads}K_{DP}C}C$	$\frac{C^2}{r} = \frac{1 + K_{DP}}{k_{ER}K_{DP}}C + \frac{1}{k_{ER}K_{DP}K_{ads}}$

* k_{DP}, $k_{LH,}$ and k_{ER} are the rate constants of the different kinetic models; K_{ads} is the adsorption constant of cyclopentanone; K_{DP} is the equilibrium constant for deprotonation; and C is the initial concentration of the cyclopentanone.

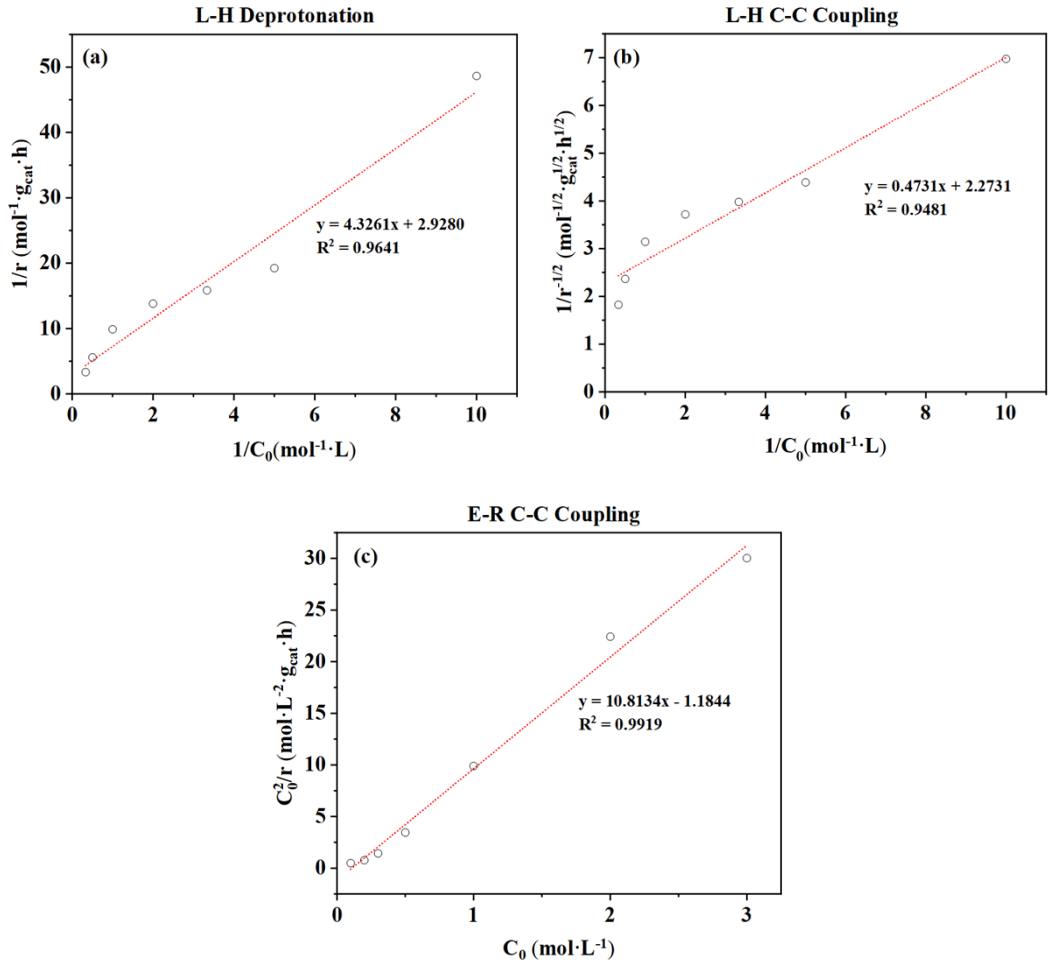

Figure S5 Linearization of initial rates over $4MgCO_3 \cdot Mg(OH)_2 \cdot 4H_2O$. Reaction condition: 0.05 g $4MgCO_3 \cdot Mg(OH)_2 \cdot 4H_2O$, 10 mL of total liquid volume, 120 °C and 0.5 h