

## Supporting information

# One-pot synthesis of biomass-derived porous carbon-based composites as an efficient acid-base bifunctional catalyst for self-condensation of n-butyraldehyde

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## Tables

Tab. S1 The reaction results catalyzed by materials synthesized with different carbon source.

Catalysts	Conversion (%)	Selectivity (%)
7.5M/PC	90.0	96.6
7.5M/CA	95.3	80.8

Reaction conditions: T= 190 °C; t= 4 h; m(MgO/PC)/m(n-butyraldehyde) = 1.0 wt%.

Tab. S2 The catalysts synthesized in this study were compared with the reported solid catalysts

Catalysts	Reaction conditions	Catalyst dosage (wt %)	Conversion (%)	Selectivity (%)	Ref.
MgO	110 °C / 8 h	25.0	98.1	87.1	[1]
$\gamma$ -Al <sub>2</sub> O <sub>3</sub>	180 °C / 8 h	15.0	87.5	87.5	[2]
Ce-Al <sub>2</sub> O <sub>3</sub>	180 °C / 8 h	15.0	93.8	88.6	[3]
TiO <sub>2</sub>	180 °C / 8 h	15.0	91.1	89.6	[4]
Chitosan	80 °C / 7 h	5.0	96.0	89.6	[5]
[HSO <sub>3</sub> -b-N(Et) <sub>3</sub> ]p-TSA	120 °C / 6 h	10.0	89.7	87.8	[6]
—/PC	190 °C / 4 h	1.0	70.7	79.2	This work
MgO/PC	190 °C / 4 h	1.0	90.0	96.6	This work

## Figures

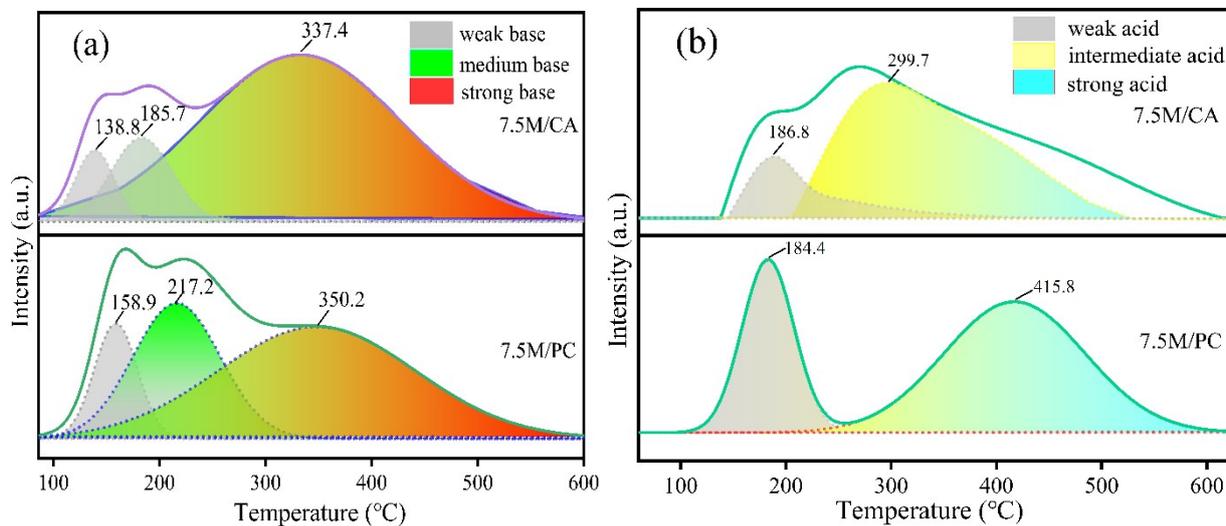


Fig. S1. (a) CO<sub>2</sub>-TPD and (b) NH<sub>3</sub>-TPD profiles of the samples 7.5M/PC and 7.5M/CA.

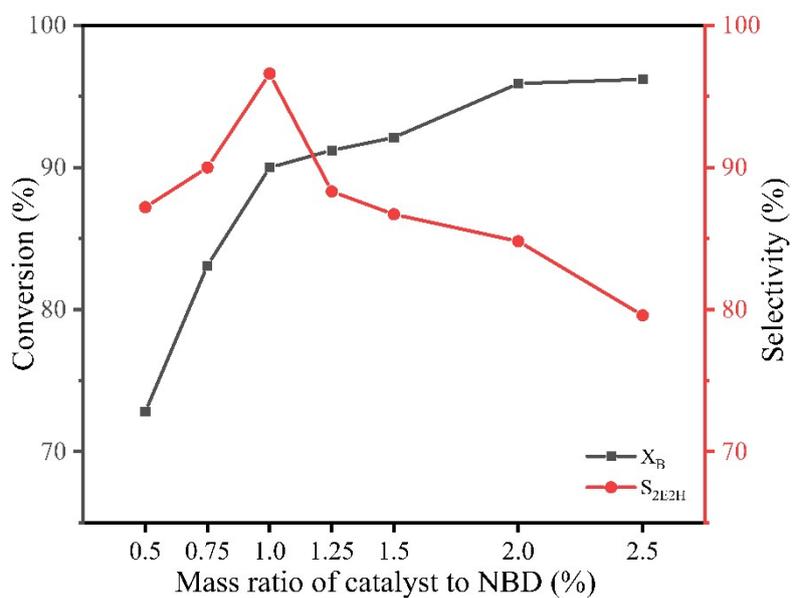


Fig. S2. Effect of catalyst dosage on n-butyraldehyde self-condensation.  
Reaction conditions: T= 190 °C; t= 4 h.

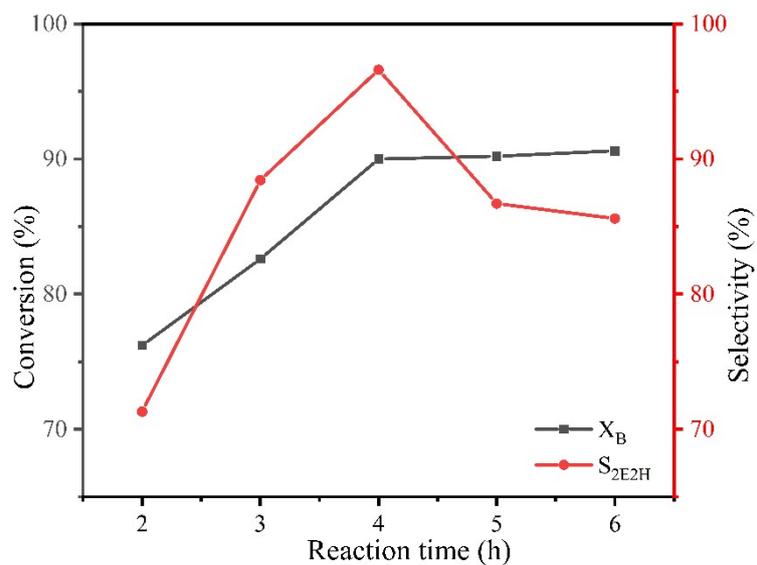


Fig. S3. Effect of reaction times on n-butylaldehyde self-condensation.  
 Reaction conditions:  $T = 190\text{ }^\circ\text{C}$ ;  $m(\text{MgO/PC})/m(\text{n-butyradehyde}) = 1.0\text{ wt}\%$ .

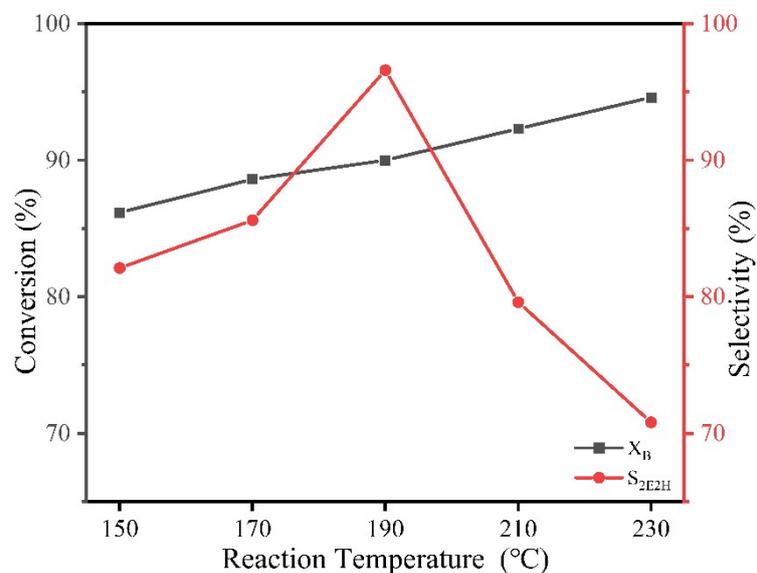


Fig. S4. Effect of reaction temperatures on n-butylaldehyde self-condensation.  
 Reaction conditions:  $t = 4\text{ h}$ ,  $m(\text{MgO/PC})/m(\text{n-butyradehyde}) = 1.0\text{ wt}\%$ .

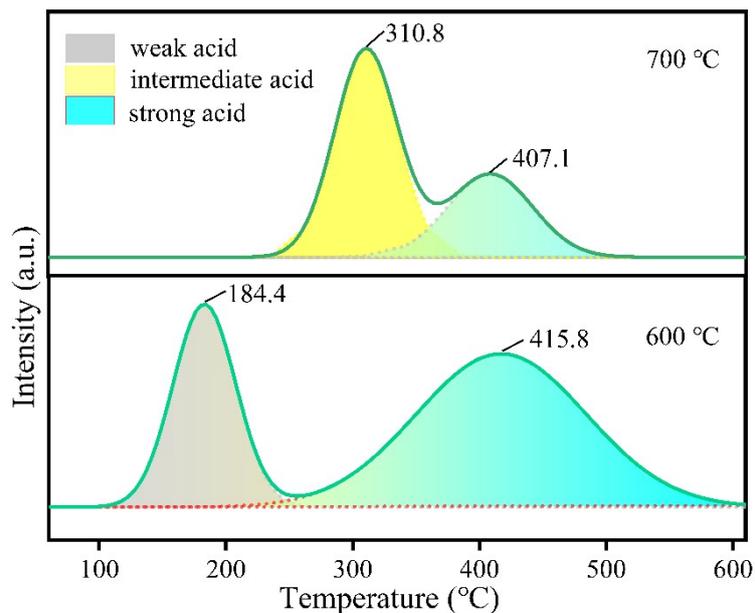


Fig. S5.  $\text{NH}_3$ -TPD profiles of the samples 7.5M/PC calcinated at 600 °C and 700 °C.

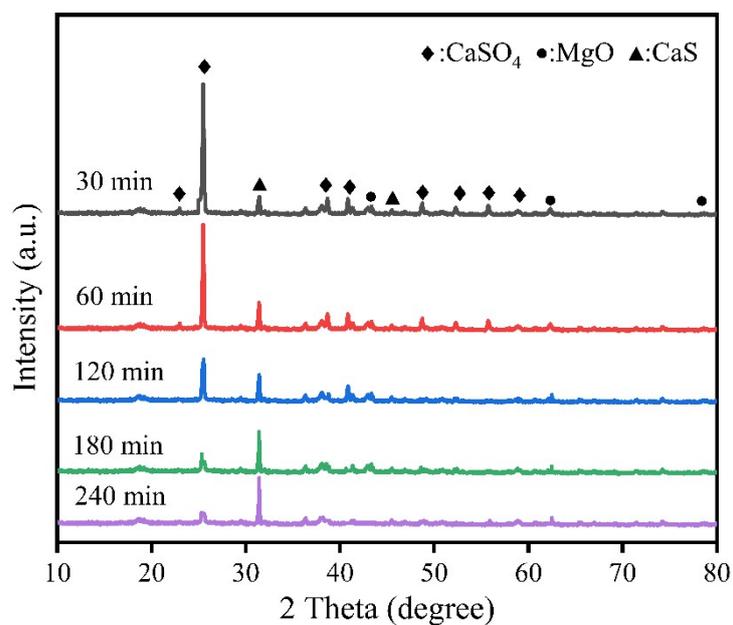


Fig. S6. XRD patterns of 7.5M/PC samples with different calcination times.

## References

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