Supporting information for

Selective aldol condensation of biomass-derived levulinic acid
and furfural in aqueous-phase over MgO and ZnO

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Table S1 TOF values of 4b on nano-ZnO-x normalized with acid sites.

<table>
<thead>
<tr>
<th>Catalyst</th>
<th>Crystalline size/ nm</th>
<th>acid sites/ umol g⁻¹</th>
<th>Normalised TOF / h⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nano-ZnO-250</td>
<td>15.5</td>
<td>119.2</td>
<td>34</td>
</tr>
<tr>
<td>Nano-ZnO-450</td>
<td>19.4</td>
<td>90.6</td>
<td>49</td>
</tr>
<tr>
<td>Nano-ZnO-650</td>
<td>34.8</td>
<td>47.2</td>
<td>73</td>
</tr>
<tr>
<td>Nano-ZnO-850</td>
<td>41.8</td>
<td>31.7</td>
<td>116</td>
</tr>
</tbody>
</table>

**Figure S1** Effect of LA/furfural mole ratio on furfural conversion and yield of 4a in the aldol reaction of furfural and sodium levulinate on MgO. Reaction conditions: 4 mmol furfural, 3 mL H₂O, 0.1 g MgO, 85 °C, 1.5 h, and 1 atm Ar.
**Figure S2** Conversion of furfural and yield of 4a as a function of time in the aldol reaction of furfural and sodium levulinate on MgO. Reaction conditions: 6 mmol sodium levulinate, 4 mmol furfural, 3 mL H₂O, 0.1 g MgO, 85 °C, and 1 atm Ar.

**Figure S3** Nitrogen adsorption and desorption isotherms curves of ZnO samples: (a) nano-ZnO-250, (b) nano-ZnO-450, (c) nano-ZnO-650, and (d) nano-ZnO-850, and (e) ZnO.
Figure S4 XRD patterns of ZnO
Figure S5 XRD patterns of nano-ZnO calcined at different temperatures.

Figure S6 Raman spectra of nano-ZnO calcined at different temperatures.
**Figure S7** Temperature-programmed desorption profile of H$_2$O on ZnO pretreated at (a) 450, and (b) 200 °C in flowing Ar.

**Figure S8** In situ DRIFT spectra of chemisorbed acetone on nano-ZnO-450 with He purging.
Figure S9  1H NMR spectra of 4b with CDCl₃ as solvent at room temperature.

Figure S10  GC-MS spectra of 4b.
Figure S11  GC-MS spectra of 4a.