

# Highly selective conversion of natural oil to alcohols or alkanes over Pd stabilized CuZnAl catalyst in mild condition

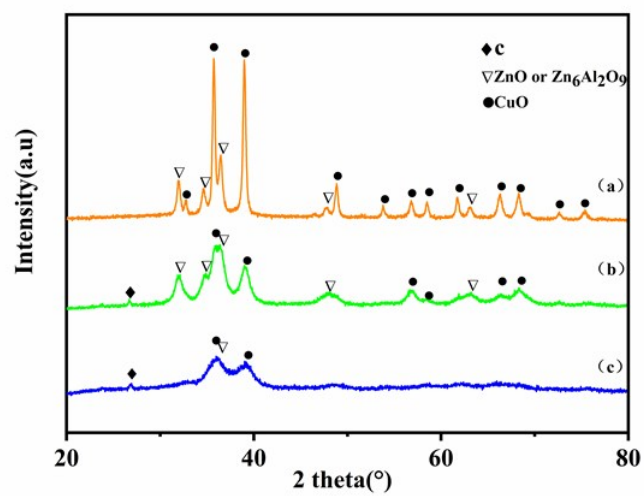
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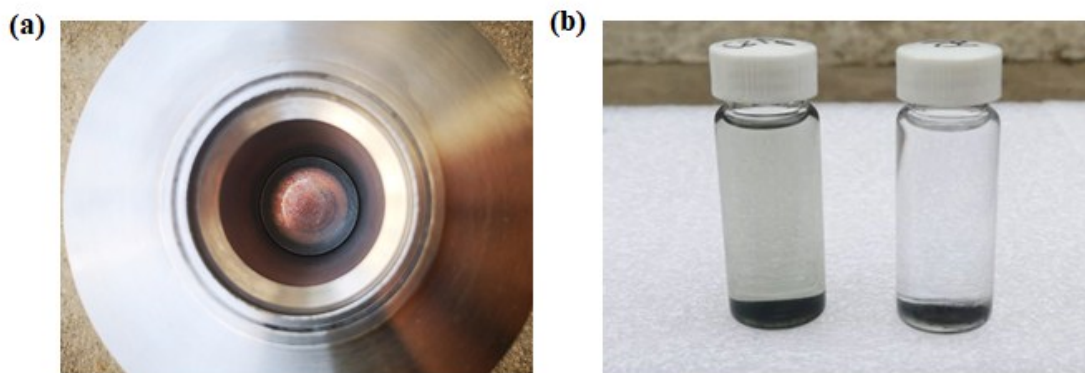
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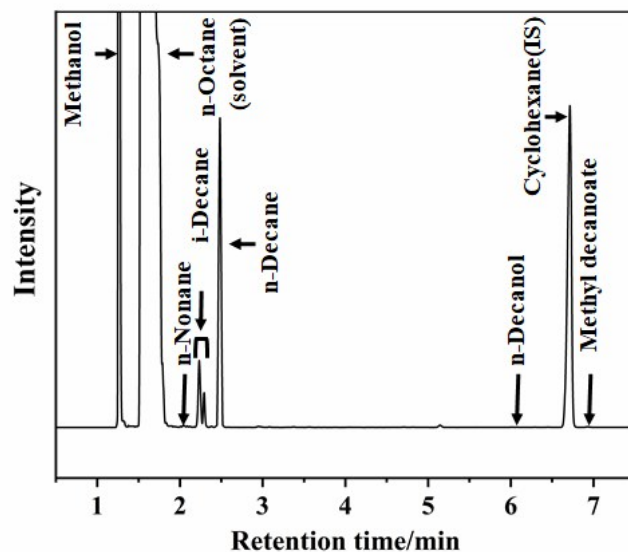
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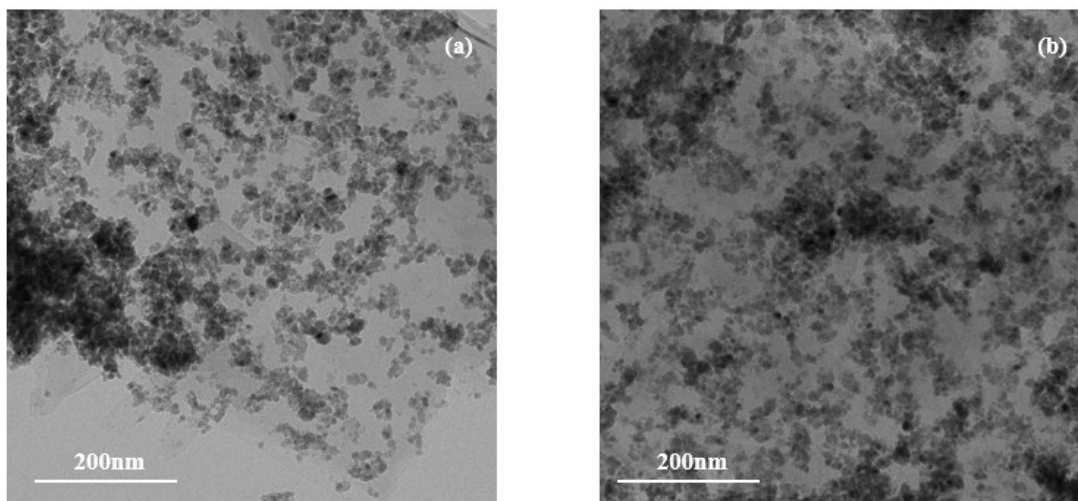
**Figure S1.** XRD patterns of (a) CuZnAl-H, (b) CuZnAl-S, (c) CuZnAl-ST.



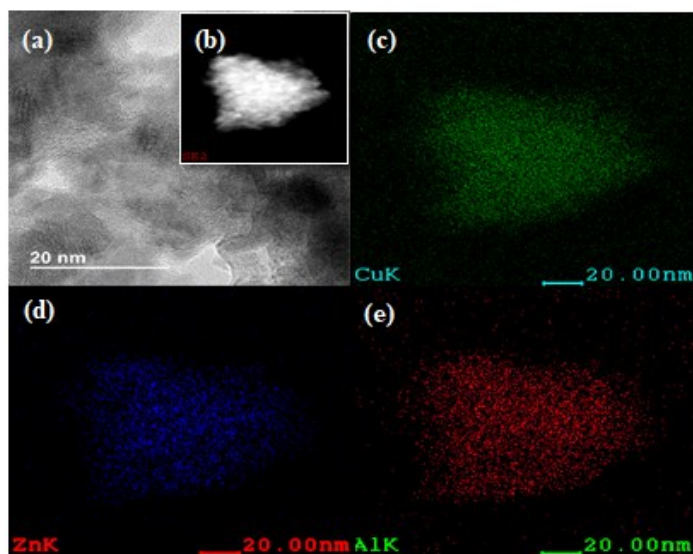
**Figure S2.** (a) The reactor after reaction with CuZnAl (b) The color of the liquid after reaction with CuZnAl (left) and 0.5% Pd/CuZnAl (right).



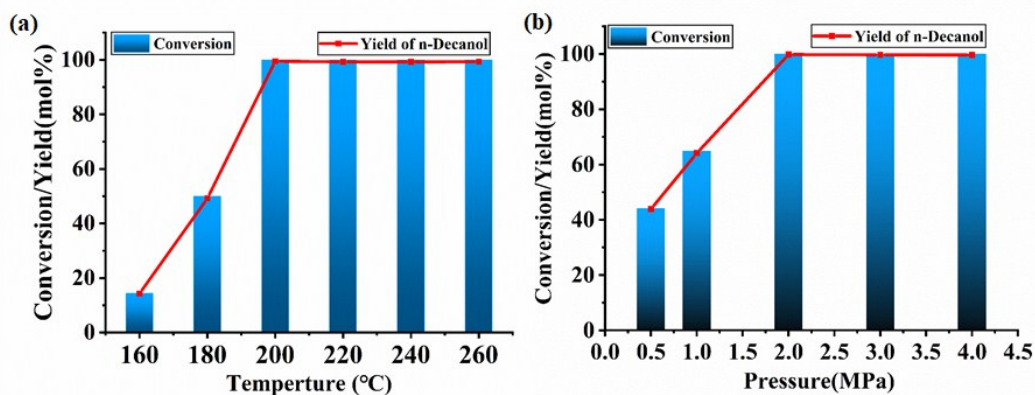
**Figure S3.** GC-FID chromatogram of liquid products after the methyl decanoate HDO with 0.5% Pd/CuZnAl and HZSM-5. Reaction conditions: 50 mg of 0.5% Pd/CuZnAl, 25 mg of HZSM-5 (Si/Al = 25), 50 mg of methyl decanoate, 50 mg of cyclohexane as IS (internal standard), 10 mL of n-octane as solvent, 8 h and 800 rpm. 800 rpm.



**Fig S4.** TEM images of (a) Fresh CuZnAl, (b) Fresh 0.5% Pd/CuZnAl



**Figure S5.** (a) HRTEM image of CuZnAl; (b) HAADF-STEM and elemental mapping images of CuZnAl: (c) Cu, (d) Zn and (e) Al elements



**Figure S6.** (a) Temperature-conversion and Temperature-yield profiles for hydrogenation of methyl decanoate to n-decyl alcohol at 2 MPa H<sub>2</sub> pressure. (b) Pressure-conversion and Pressure-yield profiles for hydrogenation of methyl decanoate to n-decyl alcohol at 200 °C. Reaction conditions: 50 mg of 0.5% Pd/CuZnAl, 50 mg of methyl decanoate, 10 mL of n-octane as solvent, 8 h and 800 rpm.

**Table S1.** Different products with 0.5% Pd/CuZnAl for HDO of coconut oil

| Entry | Products        | Yield(%) |
|-------|-----------------|----------|
| 1     | C <sub>6</sub>  | 0.2      |
| 2     | C <sub>8</sub>  | 5.0      |
| 3     | C <sub>10</sub> | 4.4      |
| 4     | C <sub>12</sub> | 41.3     |
| 5     | C <sub>14</sub> | 15.1     |
| 6     | C <sub>16</sub> | 6.8      |
| 7     | C <sub>18</sub> | 7.6      |

**Table S2.** The ICP of Pd species in 0.5% Pd/CuZnAl.

| Entry | catalyst          | Percentage (%) |
|-------|-------------------|----------------|
|       |                   | Pd             |
| 1     | Pd/CuZnAl         | 0.519          |
| 2     | Used<br>Pd/CuZnAl | 0.513          |

**Table S3.** The catalytic performance of 0.5% Pd/CuZnAl in the conversion of methyl decanoate to n-decanol.

| Entry          | Catalyst  | Conversion<br>(mol%) | Yield(mol%)     |         |
|----------------|-----------|----------------------|-----------------|---------|
|                |           |                      | C <sub>10</sub> | Decanol |
| 1 <sup>a</sup> | Pd/CuZnAl | 35.4                 | 0.1             | 35.3    |
| 2 <sup>b</sup> | Pd/CuZnAl | 100                  | 0.2             | 99.8    |

Reaction conditions: 10 mg of catalyst, 50 mg of methyl decanoate, 10 mL of n-octane as solvent, 200°C , 2 MPa H<sub>2</sub> and 800 rpm. a. 8 h; b. 32 h.