Electronic Supplementary Material (ESI) for Reaction Chemistry & Engineering.

Supporting information

A Generalized Strategy for the Ultrafast Encapsulation of Metal Oxide Nanoclusters into Zeolites

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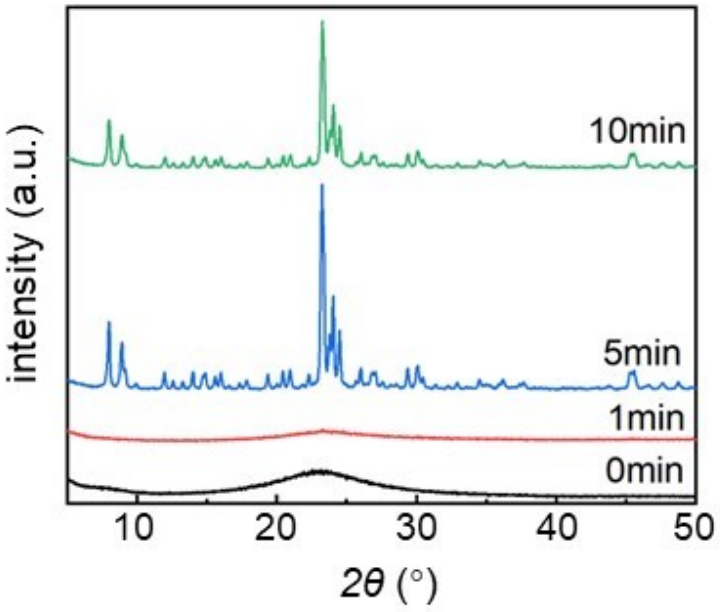

Figure S1 | XRD patterns of the silicalite-1 synthesized at 210 °C for different times.

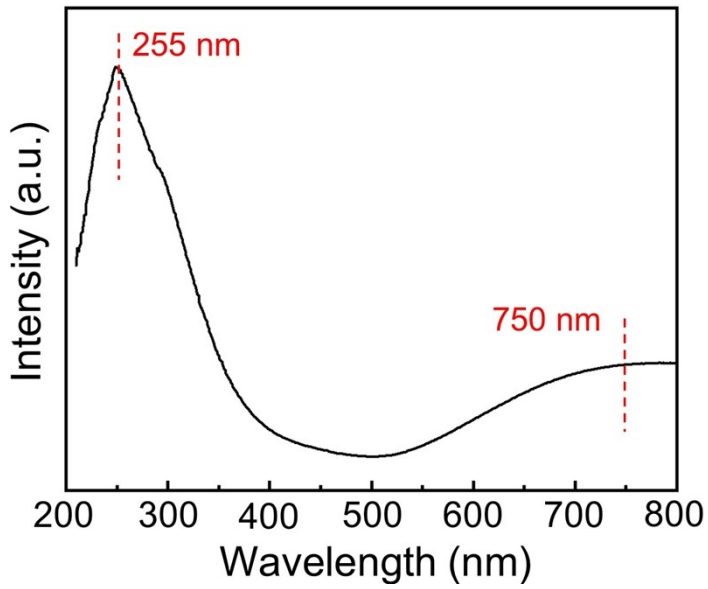

Figure S2 | UV-visible spectrum of CuO@silicalite-1.

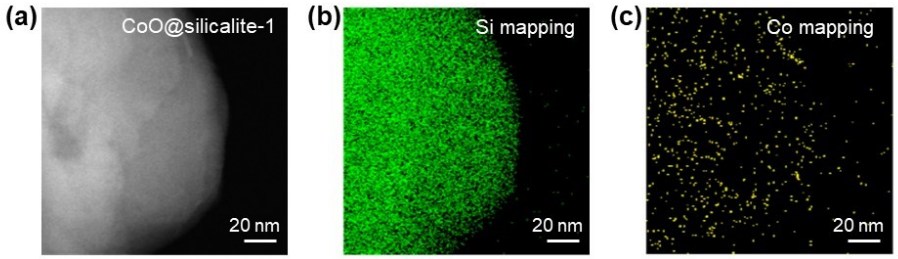

Figure S3 | The elements distribution in CoO@silicalite-1.

(a) HAADF-STEM image of CoO@silicalite-1. **(b)** and **(c)** EDX mapping of Si element and Co element, respectively.

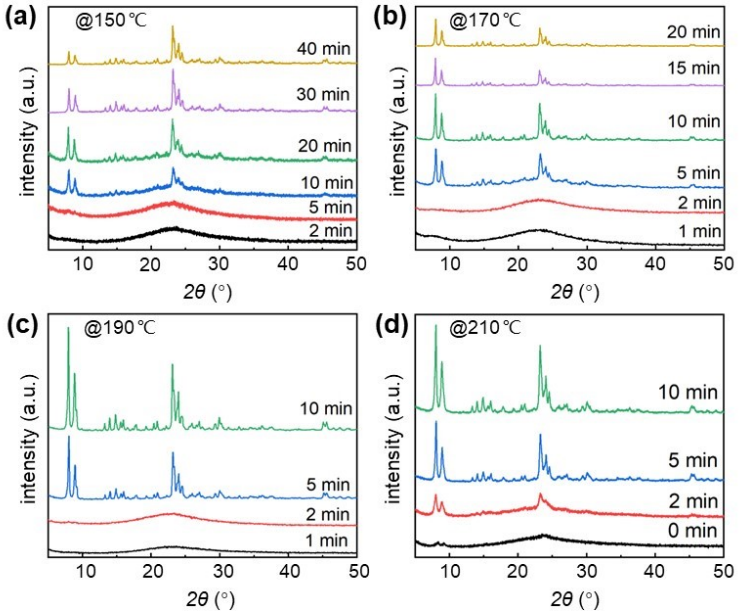

Figure S4 | Evolution of crystallinity of CuO@silicalite-1 synthesized at different temperatures over times.

(a) to (d) XRD patterns of samples synthesized over different times under 150 °C, 170 °C, 190 °C and 210 °C, respectively. (The synthesis precursor had the following molar composition: 5 NaOH: 30 SiO_2: 2 TPAOH: 690 H_2O: 1.2 $Cu(NO_3)_2$: 3.75 EDA.)

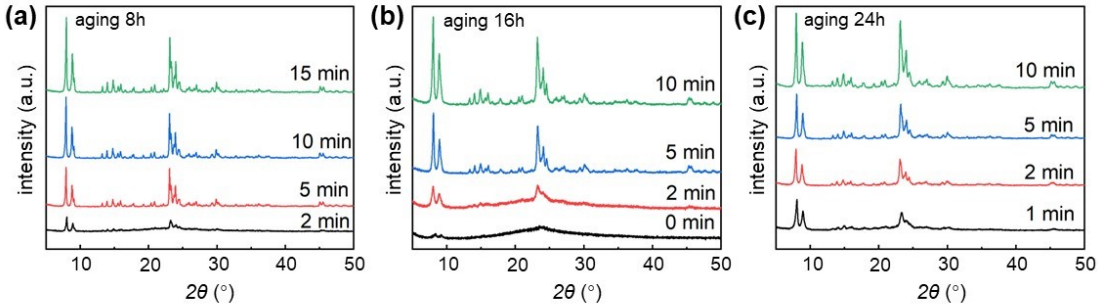

Figure S5 | Evolution of crystallinity of CuO@silicalite-1 synthesized after different aging periods.

(a) to (c) XRD patterns of samples synthesized after aging for 8 h, 16 h and 24 h, respectively. (The synthesis precursor had the following molar composition: 5 NaOH: 30 SiO_2: 2 TPAOH: 690 H_2O: 1.2 $Cu(NO_3)_2$: 3.75 EDA.)

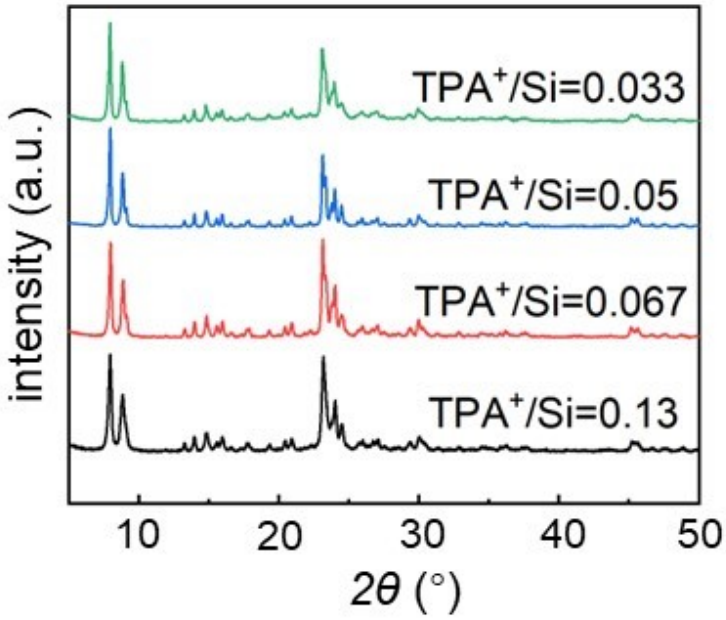

Figure S6 | XRD patterns of the CuO@silicalite-1 synthesized at 210 °C for 5 min with different TPA^+/Si ratio.

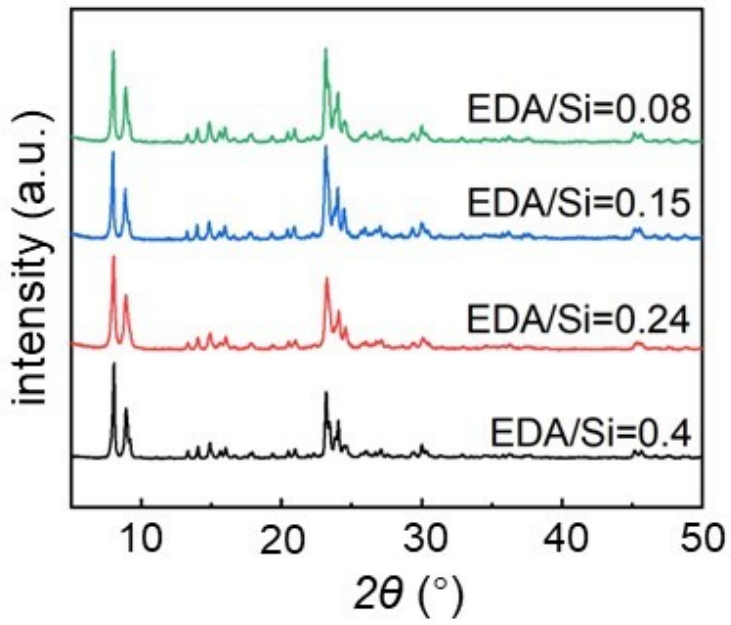

Figure S7 | XRD patterns of the CuO@silicalite-1 synthesized at 210 °C for 5 min with different EDA/Si ratio.

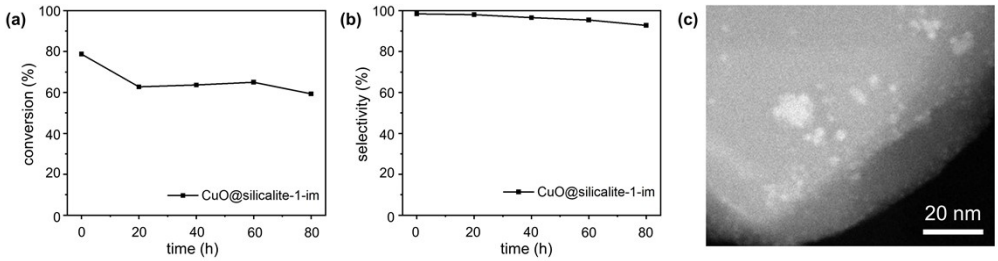

Figure S8 | Catalytic performance of the CuO@silicalite-1 zeolites synthesized via impregnation in the dehydrogenation of ethanol to acetaldehyde.

(a) and (b) Conversion and selectivity of the sample in the reaction, respectively. (c) HAADF-STEM image of CuO@silicalite-1 synthesized via impregnation after 80 h of catalytic reaction. The CuO content in the catalyst was 2.4 wt%.

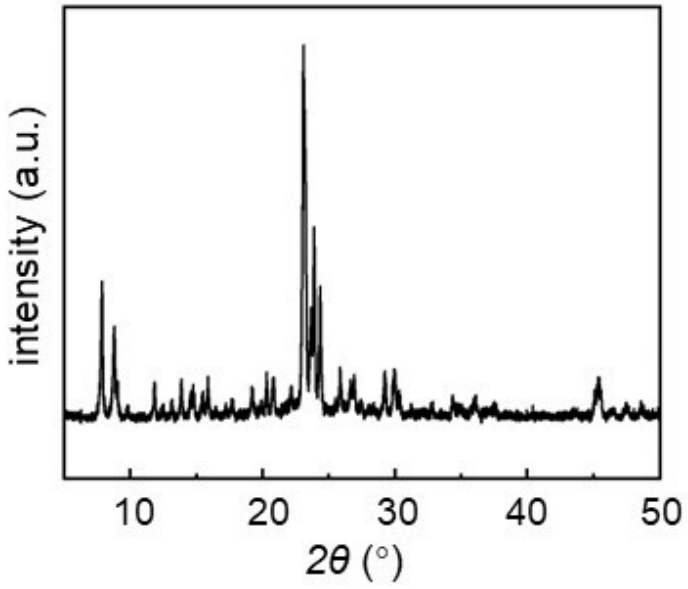

Figure S9 | XRD patterns of the CuO@silicalite-1 synthesized via continuous-flow encapsulation.