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Efficient synthesis of 2,5-dihydroxymethylfuran and 2,5-dimethylfuran from 5-hydroxymethylfurfural using minerals-derived Cu catalysts as versatile catalysts

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Table S1 Catalytic performance of reduced CuZn-2, unreduced CuZn-2 and reduced CuZn-inf for DHMF production. [a]

Catalyst	P (MPa)	T (°C)	t (h)	HMF conversion (%)
Reduced CuZn-2	1.5	100	1	83.5
Reduced CuZn-inf	1.5	100	1	16.3
Unreduced CuZn-2	1.5	100	1	0.7

[a] Conditions: HMF 1.5 g, catalyst 0.5 g, 1,4-dioxane 35 ml.

We performed model tests over reduced CuZn-2, unreduced CuZn-2 and reduced CuZn-inf for DHMF production at 100 °C (**Table S1**). The reduced CuZn-2 catalyst (composed of highly dispersed metallic Cu and ZnO sites) showed a HMF conversion of 83.5%; the reduced CuZn-inf catalyst (composed of metallic Cu sites) showed a conversion of 16.3%. In contrast, the unreduced CuZn-2 (mainly composed of ZnO and unreduced CuO sites) give a conversion of 0.7%. The results revealed that bare ZnO can hardly catalyze HMF hydrogenation to DHMF at the conditions.

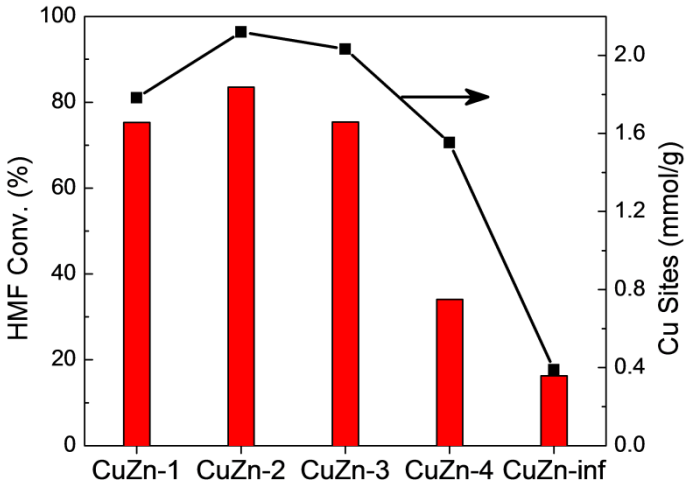

Figure S1. Catalytic performance of CuZn-x catalysts within 1 h and the correlation with metallic Cu specific areas (100 ^{o}C, 1.5 MPa H_2, HMF 1.5 g, catalyst 0.5 g).

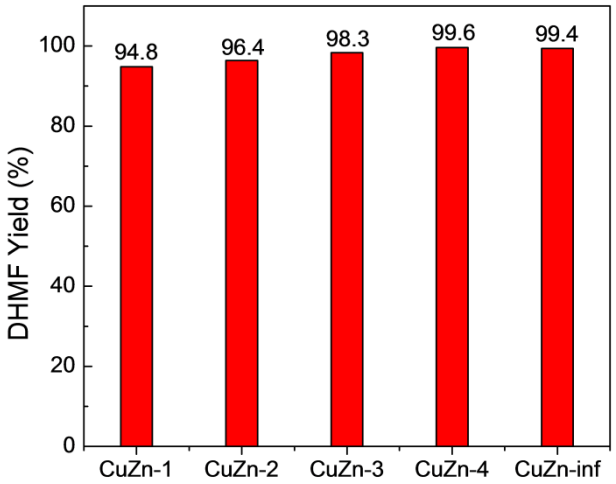

Figure S2. Catalytic performance of CuZn-x catalysts for 20 h (100 ^{o}C, 1.5 MPa H_2, HMF 1.5 g, catalyst 0.5 g).

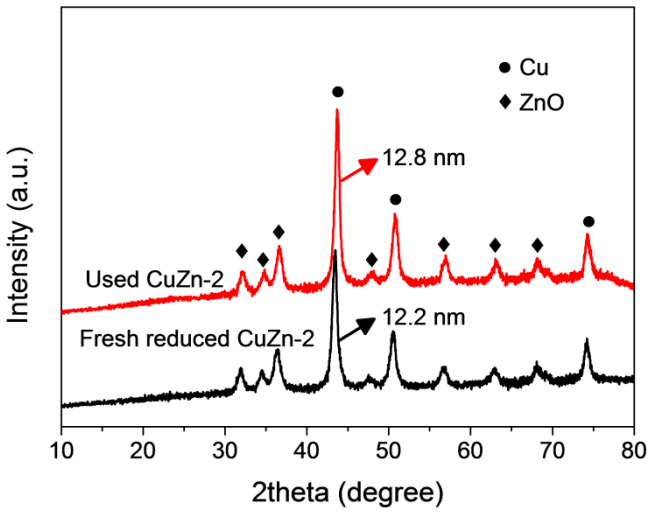

Figure S3. XRD spectra of fresh reduced and used CuZn-2 catalysts (Metallic Cu particle sizes were calculated using Scherrer Equation).