

Electronic Supplementary Information (ESI)

Renewable fuels from biomass-derived compounds: Ru containing hydrotalcites as catalysts for 2,5-dimethylfuran from HMF

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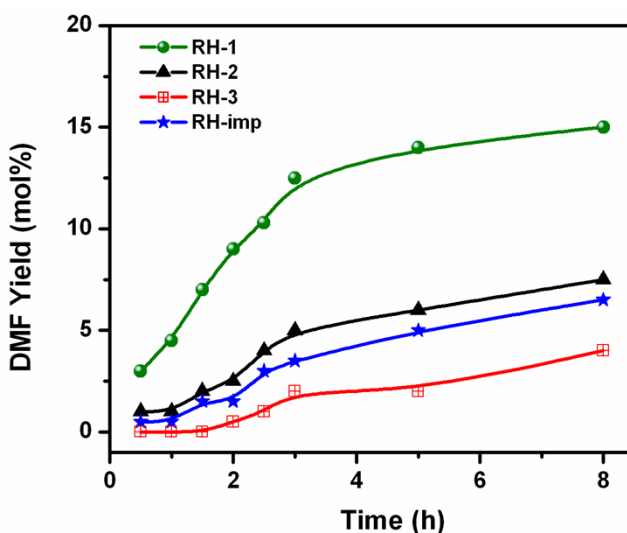


Fig. S1 Yield of DMF on various catalysts in the absence of hydrogen.

Reaction conditions: HMF (1 mmol, 126 mg); catalyst (50 mg); temperature (220 °C); solvent (2-propanol, 25 mL); N₂ pressure (5 bar); stirring speed (500 rpm).

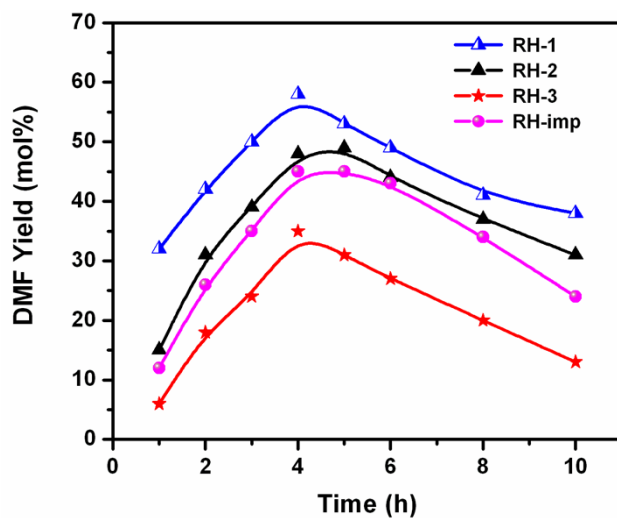


Fig. S2 DMF yields over various catalysts as a result of CTH plus hydrogenation under H₂ pressure. Reaction conditions: HMF (1 mmol, 126 mg); catalyst (50 mg); temperature (220 °C); H₂ pressure (10 bar); solvent (2-propanol, 25 mL); stirring speed (500 rpm).

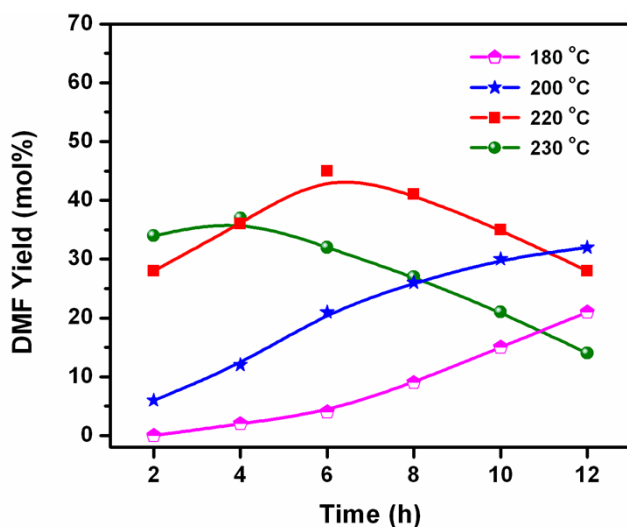


Fig. S3 Effect of reaction temperature on DMF yield under non-CTH conditions over RH-1 catalyst. Reaction conditions: HMF (1 mmol, 126 mg); catalyst (RH-1, 50 mg); H₂ pressure (10 bar); solvent (THF, 25 mL); stirring speed (500 rpm).

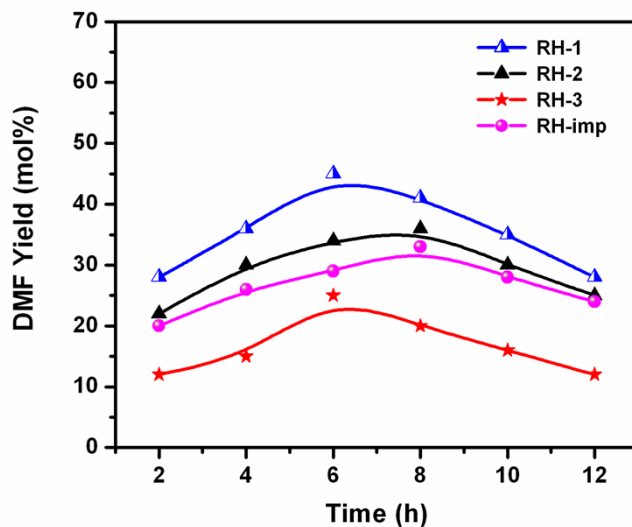


Fig. S4 Effect of Ru content on DMF yield over various catalysts under non-CTH conditions. Reaction conditions: HMF (1 mmol, 126 mg); catalyst (50 mg); temperature (220 °C); H₂ pressure (10 bar); solvent (THF, 25 mL); stirring speed (500 rpm).

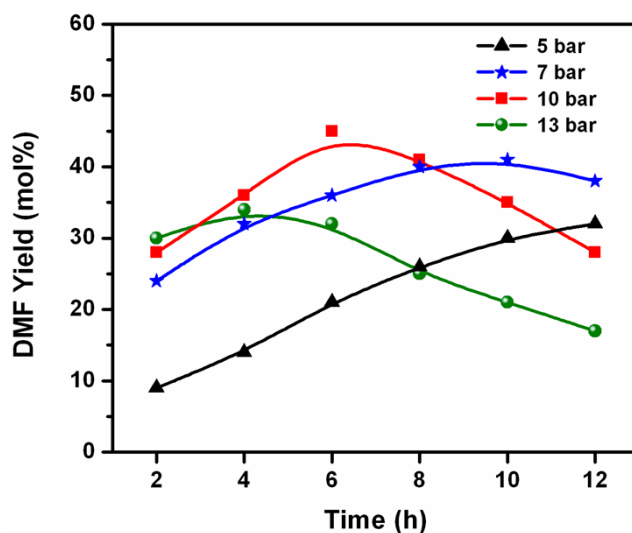


Fig. S5 Effect of H₂ pressure on DMF yield over RH-1 catalyst under non-CTH conditions. Reaction conditions: HMF (1 mmol, 126 mg); catalyst (RH-1, 50 mg); temperature (220 °C); solvent (THF, 25 mL); stirring speed (500 rpm).

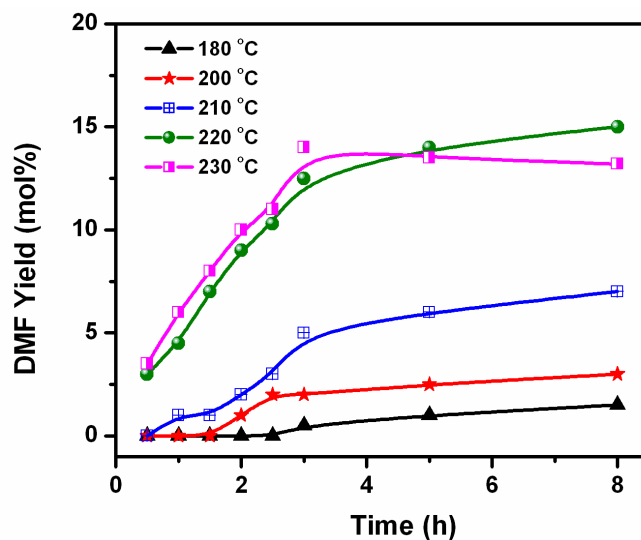


Fig. S6 Effect of reaction temperature on CTH over RH-1 catalyst in the absence of H₂. Reaction conditions: HMF (1 mmol, 126 mg); catalyst (RH-1, 50 mg); solvent (2-propanol, 25 mL); N₂ pressure (5 bar); stirring speed (500 rpm).

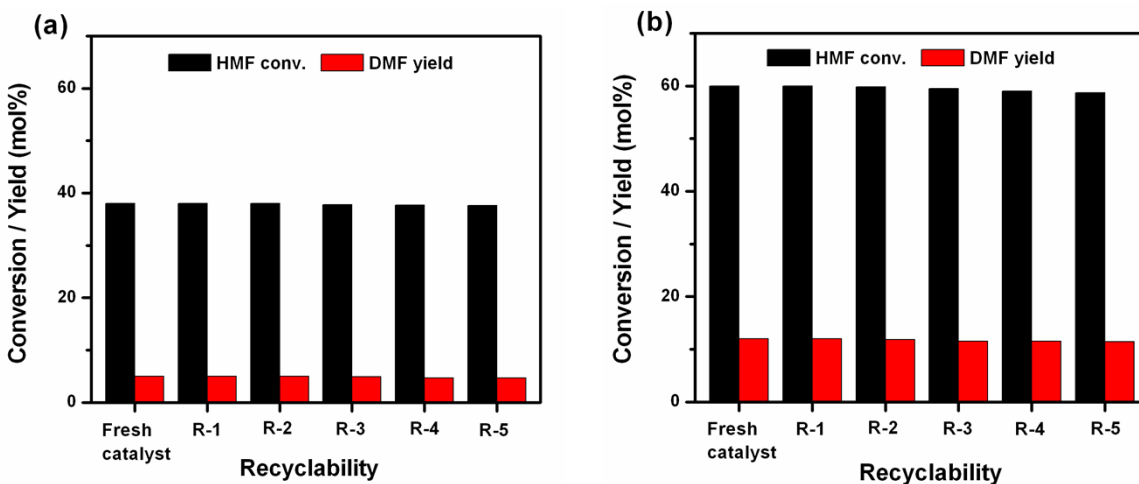


Fig. S7 The recyclability experiments of RH-1 catalyst in HMF hydrogenolysis; (a) after 4 h of reaction and (b) after 8 h of reaction.

Reaction conditions: Solvent (2-propanol, 25 mL); molar ratio of HMF to Ru of 360; temperature (170 °C); H₂ pressure (10 bar); stirring speed (500 rpm).

Table S1: Metal surface area and Ru particle size.

Catalyst	Metal surface area (m ² /g)		Average Ru particle size (nm)	
	From H ₂ -chemisorption	From TEM*	From H ₂ -chemisorption	From TEM*
RH-1	0.97	0.88	2.8	3.1
RH-2	1.20	1.13	4.0	4.3
RH-3	0.56	0.58	12.9	14

*TEM-derived metal surface area calculated by assuming that the ruthenium particles are hemispherical in shape with the flat side on the support.