

Supplementary material

**Production of renewable long-chained cycloalkanes from
biomass-derived furfurals and cyclic ketones**

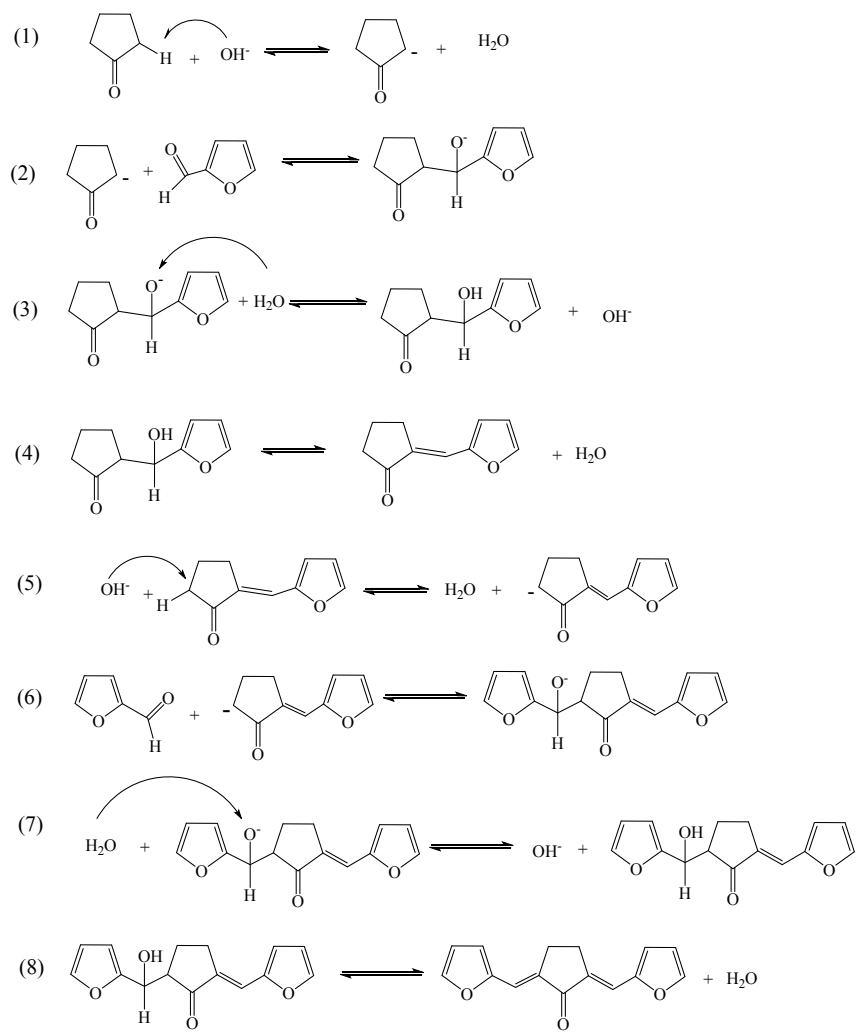
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Scheme S1 Formation mechanism of FF-CP-FF by aldol condensation of CP and FF.



Fig. S1 Photographs of the condensation intermediates: (a) FF-CP-FF; (b) FF-CH-FF; (c) HMF-CP-HMF; (d) HMF-CH-HMF.

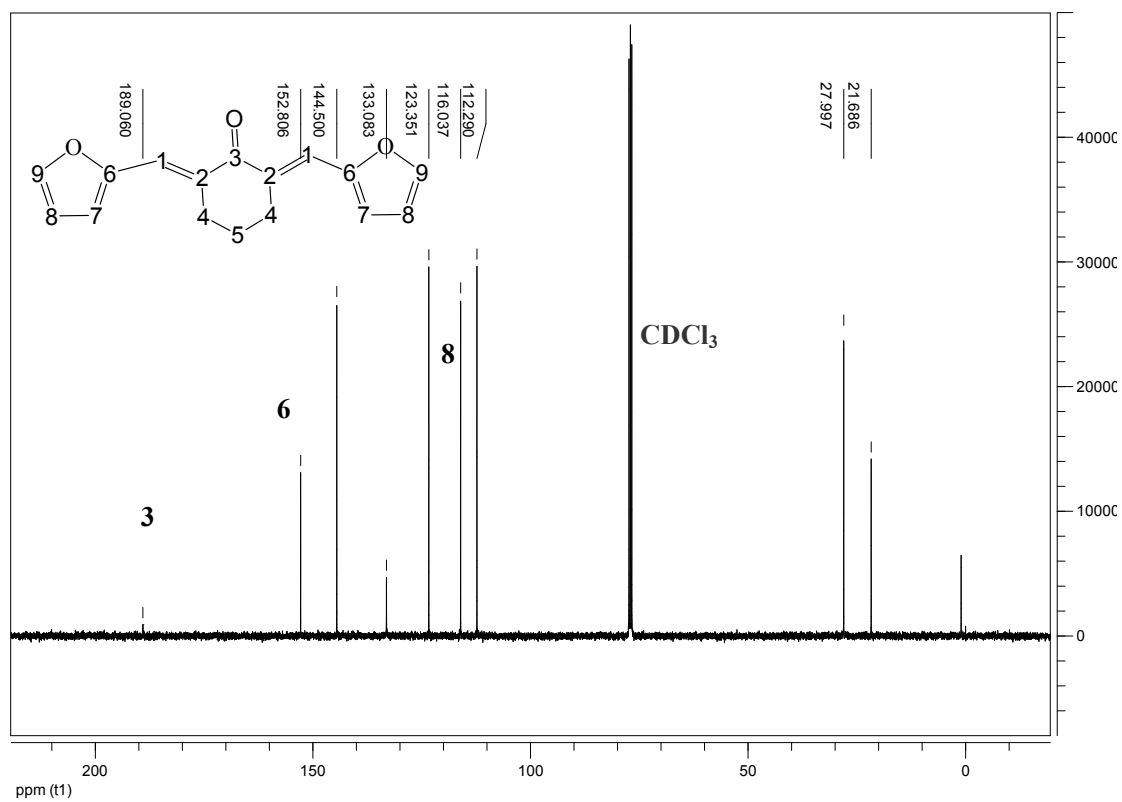


Fig. S2 The ^{13}C NMR spectrum of FF-CH-FF.

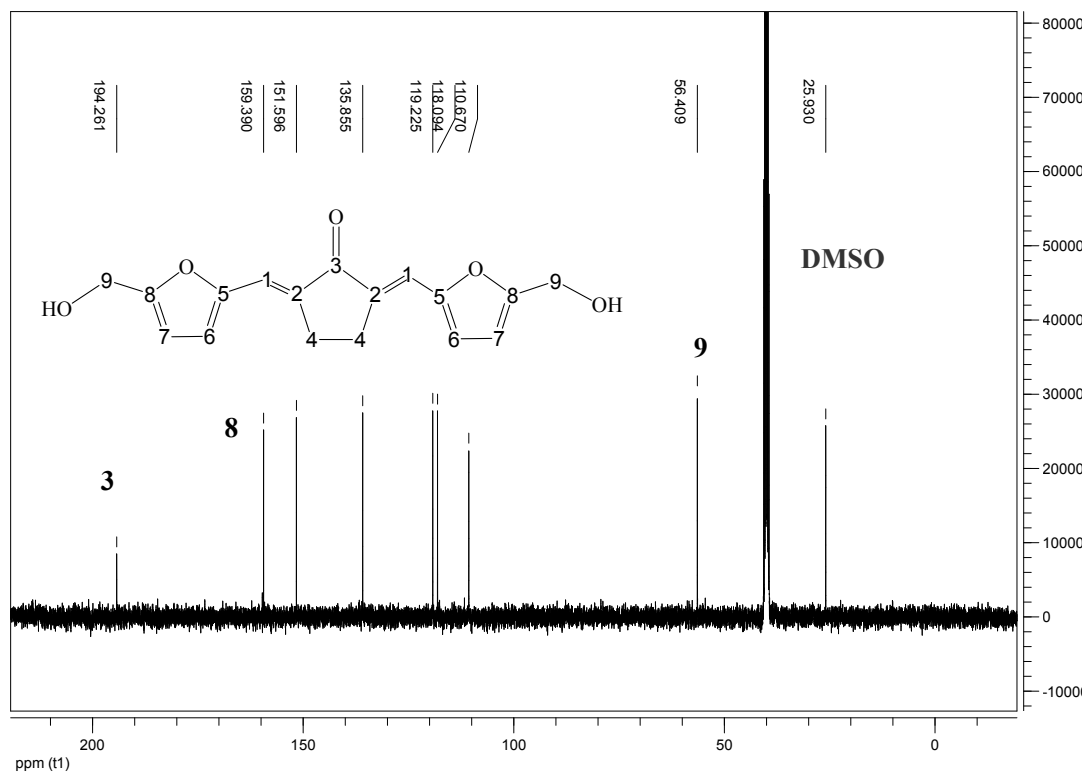


Fig. S3 The ^{13}C NMR spectrum of HMF-CP-HMF.

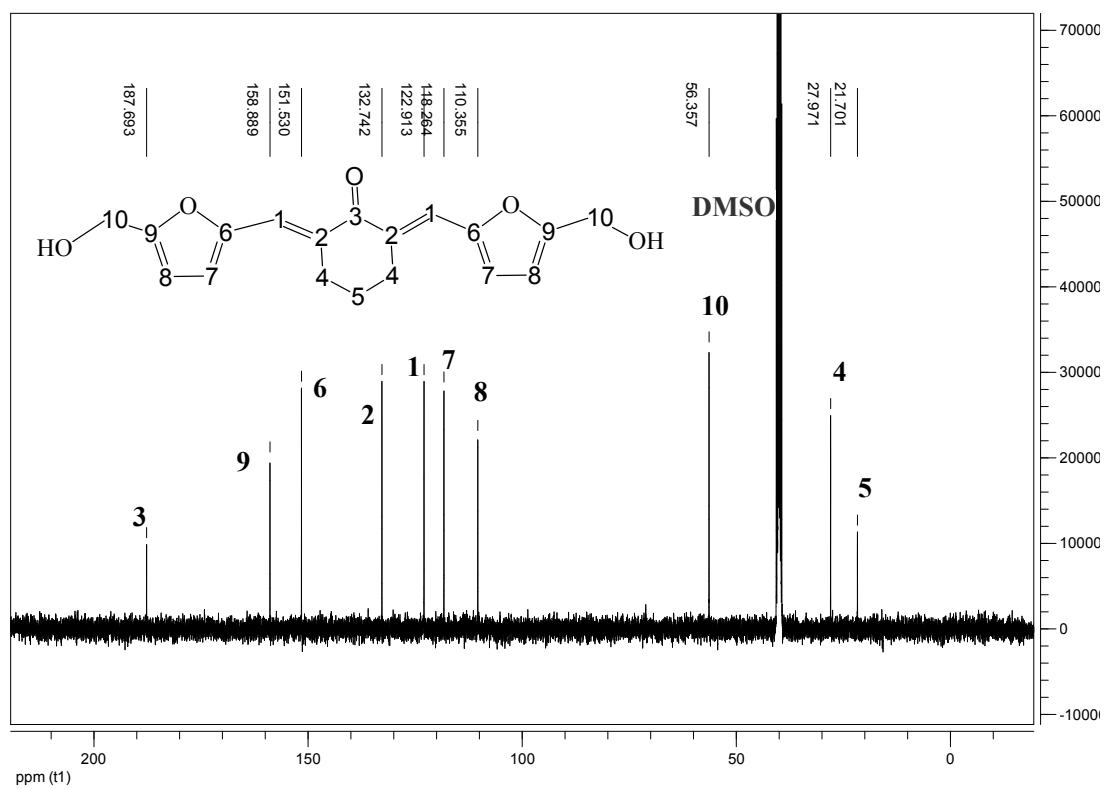


Fig. S4 The ^{13}C NMR spectrum of HMF-CH-HMF.



Fig. S5 Photograph of intermediate produced by FF-CP-FF hydrogenation at 150 °C over Pd/C.
Reaction condition: 1 mmol FF-CP-FF, 15 mL H₂O, 0.05g Pd/C, 4 MPa H₂, 3 h.

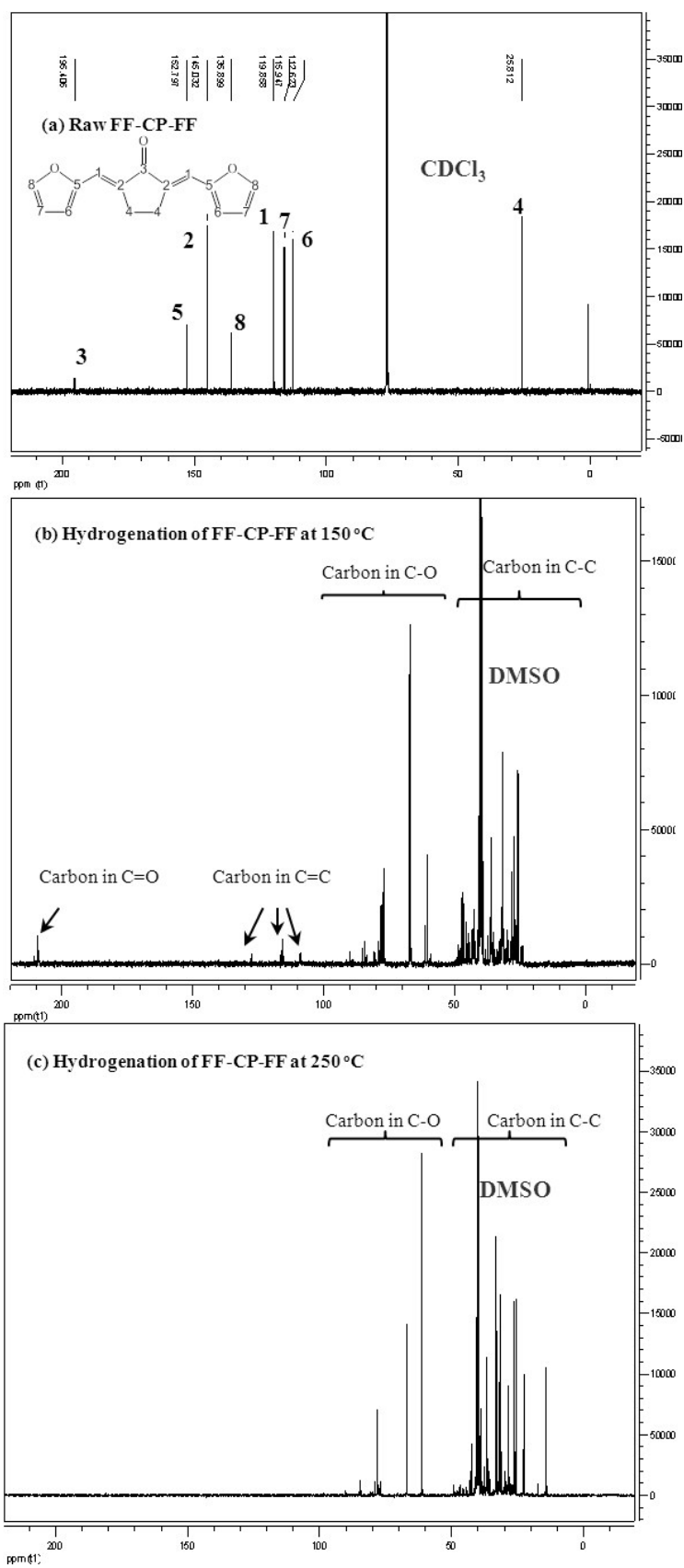


Fig. S6 The ¹³C NMR spectra of hydrogenated products from FF-CP-FF at different temperatures. Reaction condition: 1 mmol FF-CP-FF, 15 mL H₂O, 0.05g Pd/C, 4 MPa H₂, 3 h.

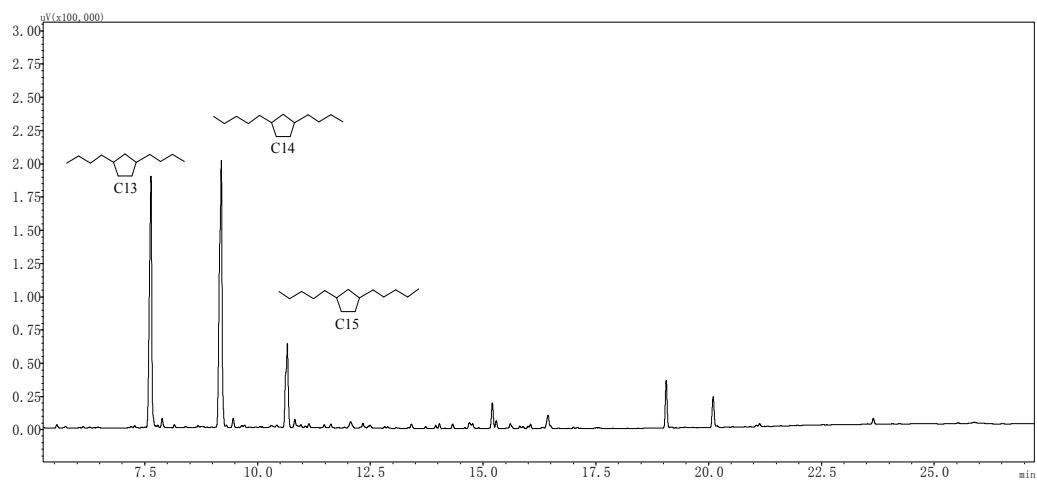


Fig. S7 Representative GC result from hydrodeoxygenation of FF-CP-FF. Reaction conditions: 1.0 mmol FF-CP-FF, 15 mL H₂O, 0.05 g Pd/C, 0.10 g ZrP, 300 °C, 3 h and 4 MPa H₂ pressure.