Electronic Supplementary Information (ESI)

Production of jet fuel-range hydrocarbon biofuel by hydroxyalkylation-alkylation of furfural with 2-methylfuran and hydrodeoxygenation of C_{15} fuel precursor over Ni/γ-Al_2O_3 catalyst: A reaction mechanism

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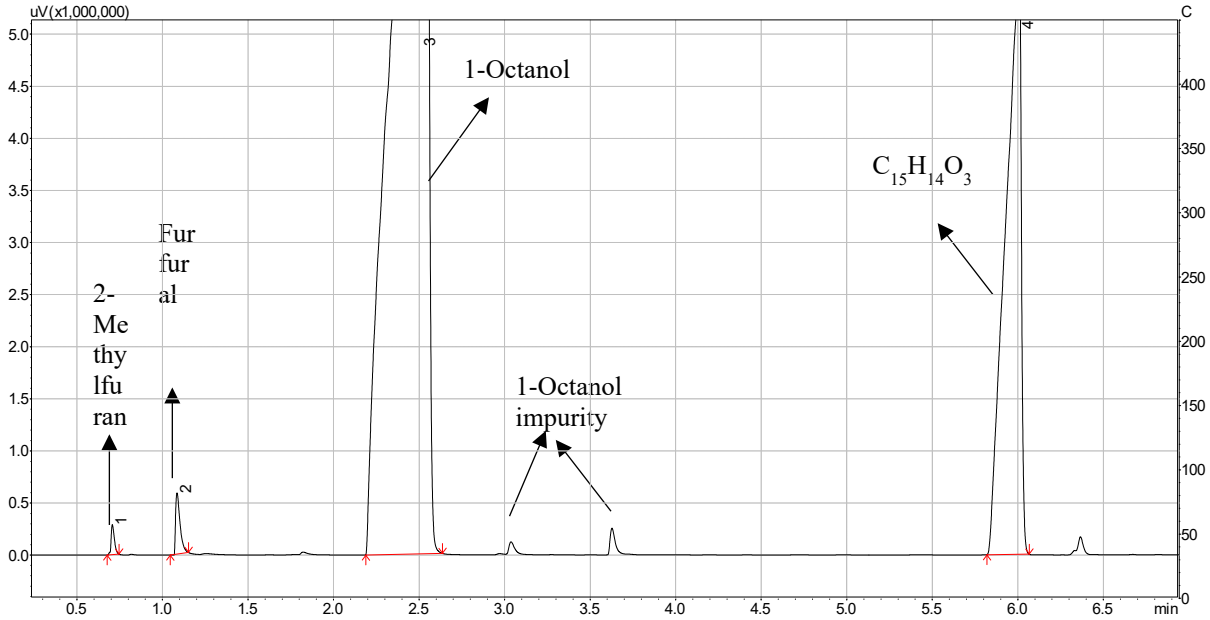


Fig. S1. A typical GC-FID chromatogram for HAA of 2-MF with furfural. **GC analysis procedure**: ZB-5HT capillary column (30m × 0.32mm × 0.10µm). The oven temperature was increased from 313 K to 508 K using a ramp rate of 10 K/min and maintained there for four minutes. The injector and detector temperatures were maintained at 613 K and 653 K, respectively. **Reaction conditions**: 323 K, 1 g CER, and 2:1 2-MF/furfural.

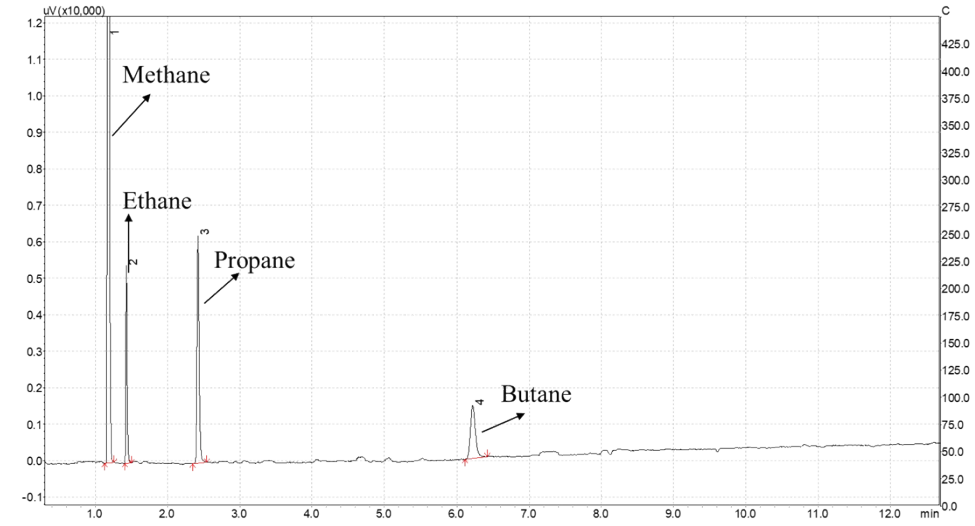


Fig. S2. GC-FID chromatogram of gas-phase samples. GC conditions: GS-Gaspro column (30 m × 0.32 mm × 0.1 µm), 523 K injector and detector temperature, and initial oven temperature of 343 K for 5 min, increased to 503 K with 10 K/min, and hold time there for 4 min. Reaction conditions: 0.5 g 20NiAl, 300 min of reaction time, 543 K, and 30 bar H_2.

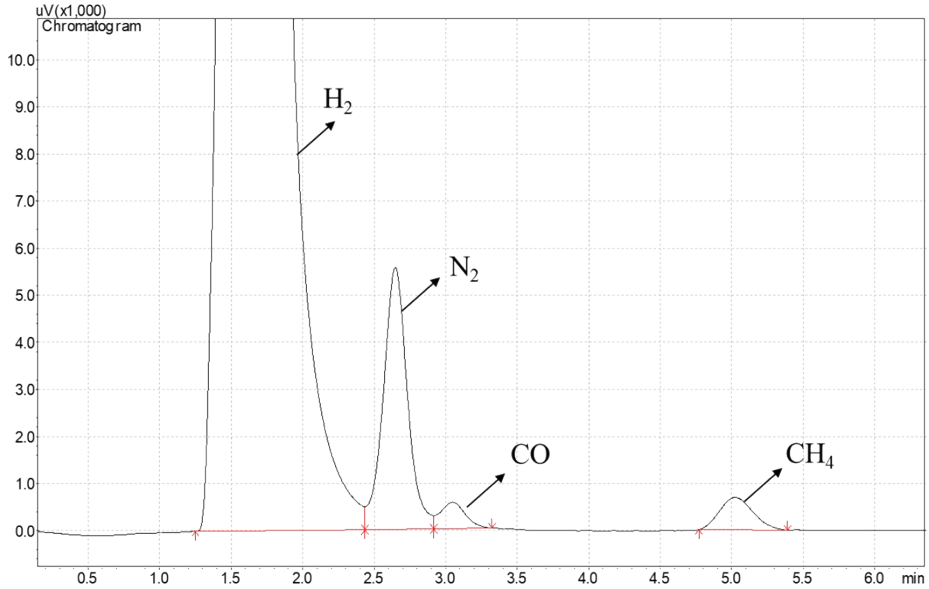
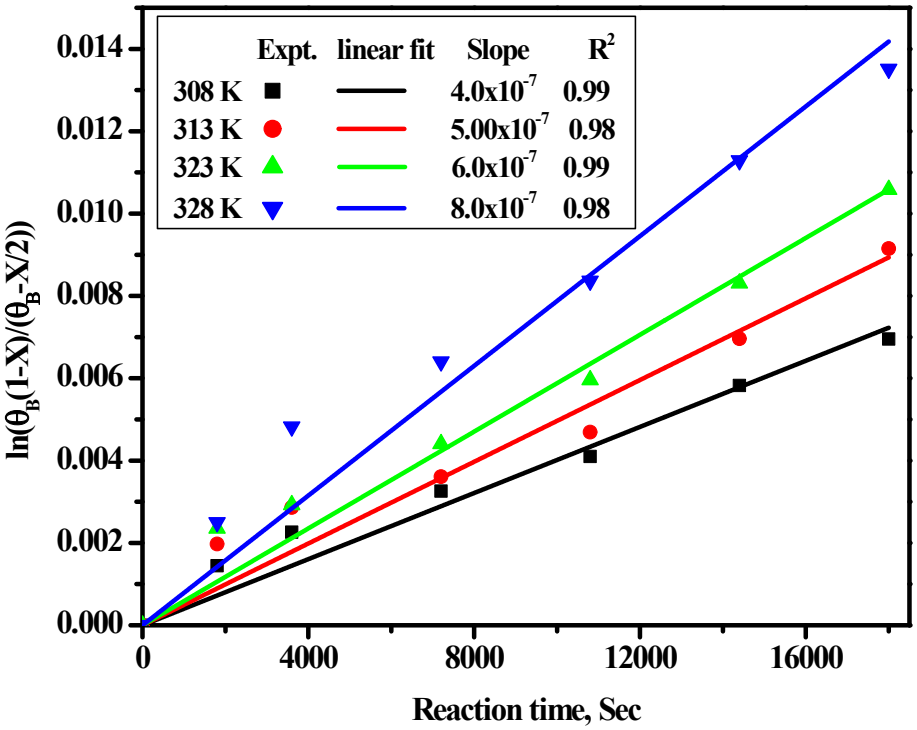


Fig. S3. GC-TCD chromatogram of gas-phase samples. GC conditions: Carboseive S-II column, 373 K injector temperature, 523 K detector temperature, and 373 K oven temperature. Reaction conditions: 0.5 g 20NiAl, 543 K, and 30 bar H_2.



$$ln\frac{\theta_B(1-X)}{(\theta_B-\frac{X}{2})}$$

Fig. S4. Plot of *vs.* time (t).

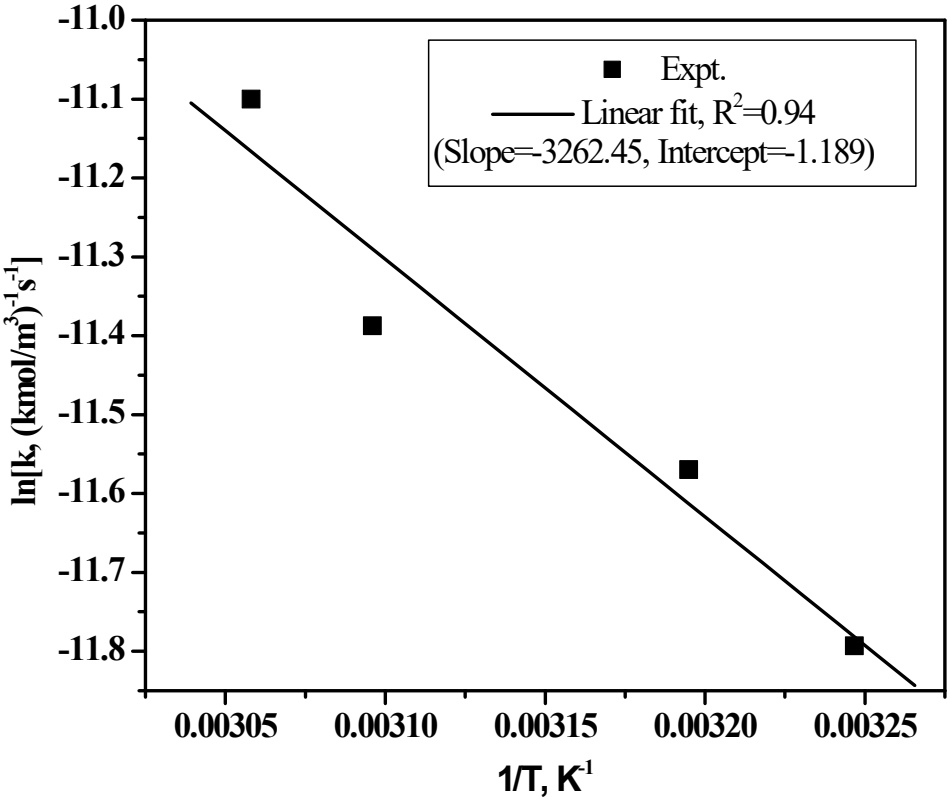


Fig. S5. Arrhenius plot of 1/T *vs*. ln(k).

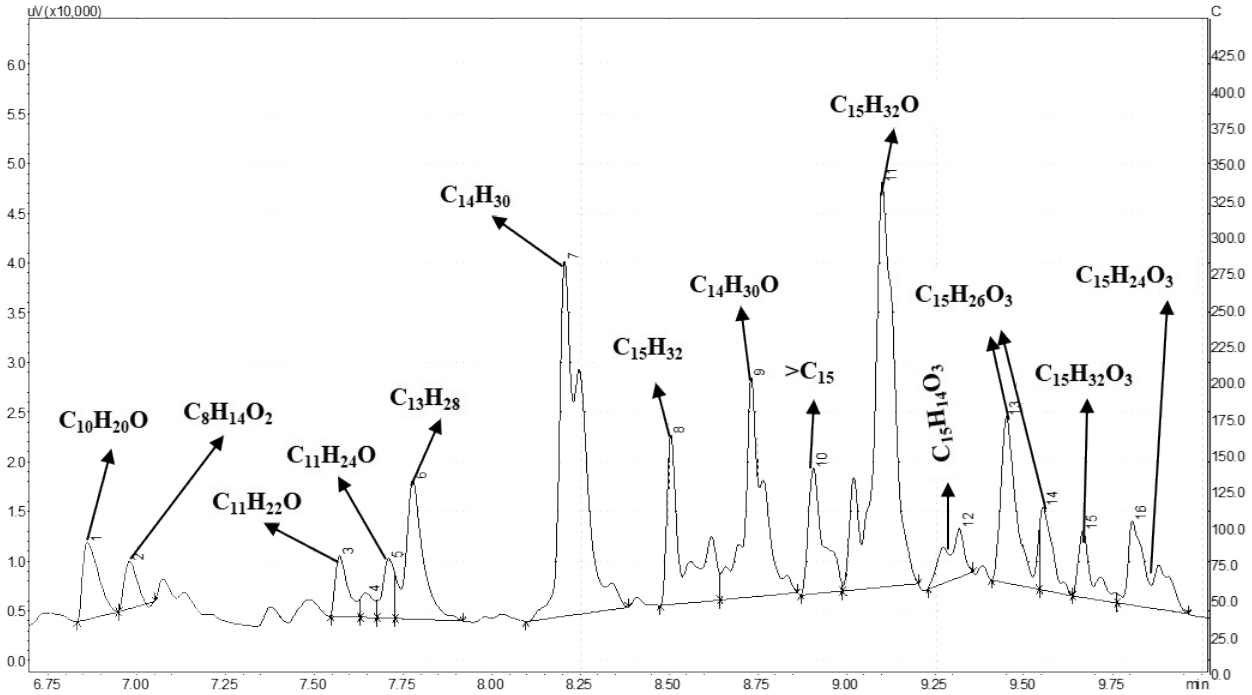


Fig. S6. A typical GC-FID chromatogram for HDO of C_{15} fuel precursor. Reaction conditions: 0.5 g 20NiAl, 573 K, 120 min of reaction time, and 30 bar H_2.

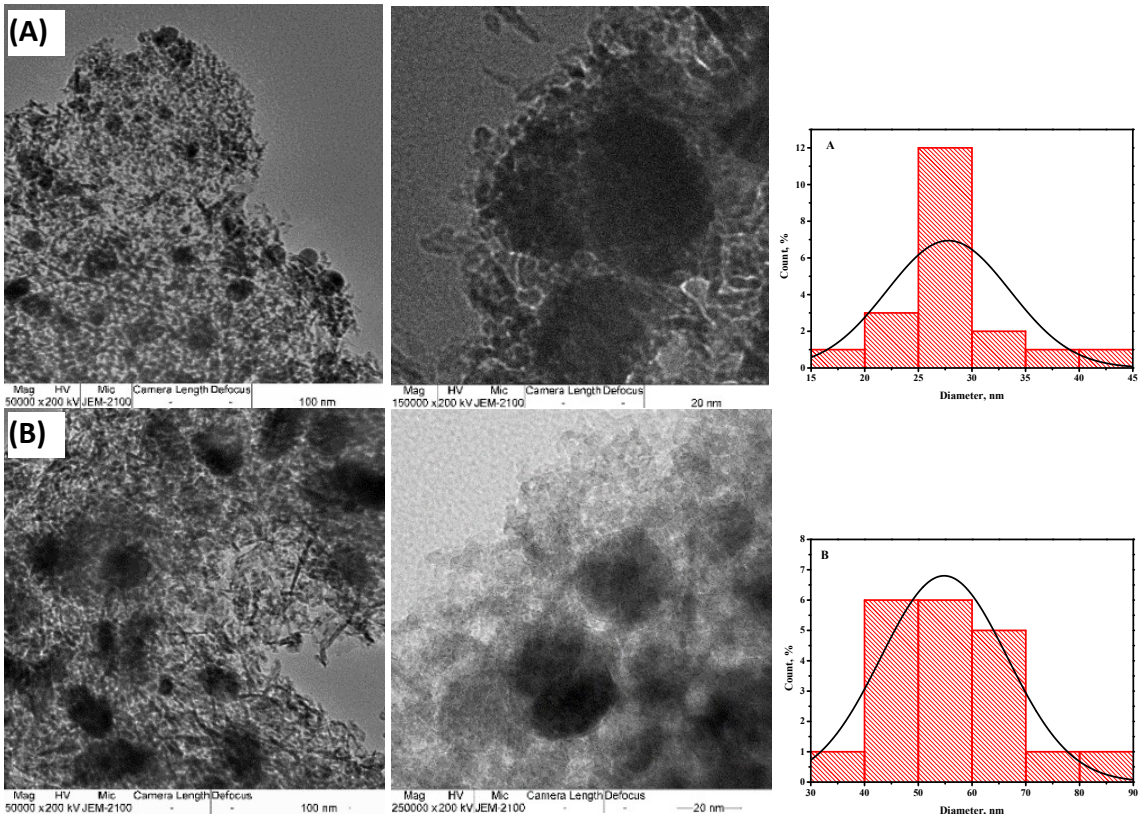


Fig. S7. HR-TEM images of (A) freshly prepared and (B) regenerated Ni/γ-Al_2O_3 catalyst.

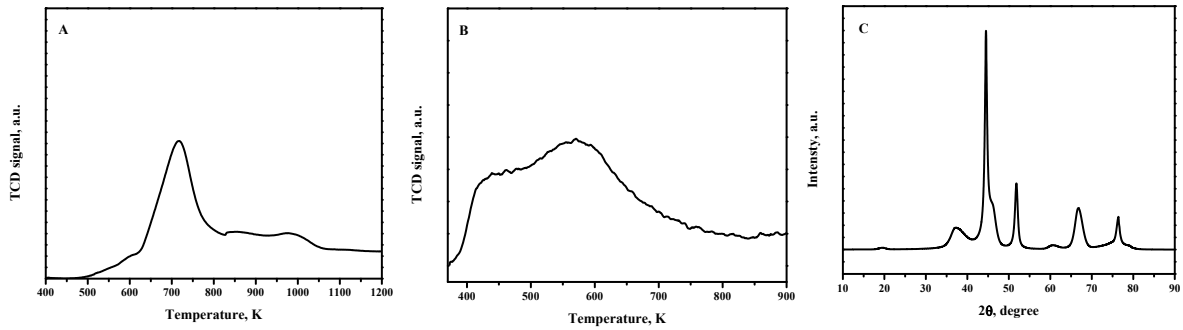


Fig. S8. (A) TPR profile of regenerated catalyst (calcined), (B) NH_3-TPD profile and (C) powder XRD pattern of regenerated catalyst (reduced).