Supplementary Information (SI) for Catalysis Science & Technology.

Electronic Supplementary Information for

Highly efficient and selective aqueous phase hydrogenolysis of furfural to 1,5-pentanediol using bimetallic Ru-SnO_x/γ–Al_2O_3 catalysts†

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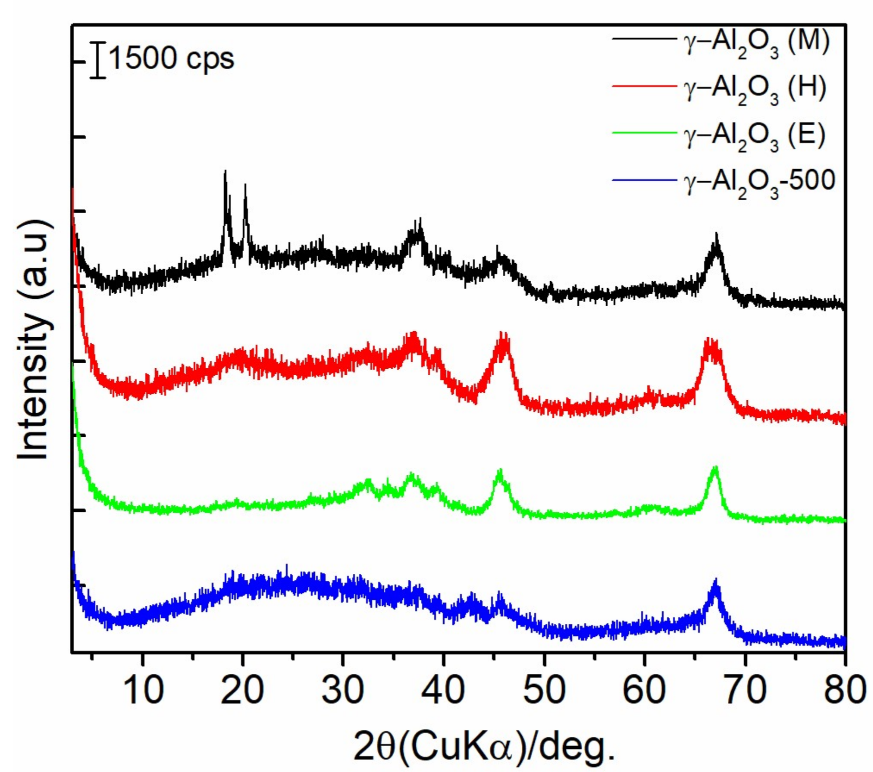

Fig. S1 XRD patterns of the hydrargillite-derived γ–Al_2O_3-500, and three types commercially available of Cariact-γ–Al_2O_3(E) (Evonik); (γ–Al_2O_3(H)(HWNANO), and -γ–Al_2O_3(M) (Merck).

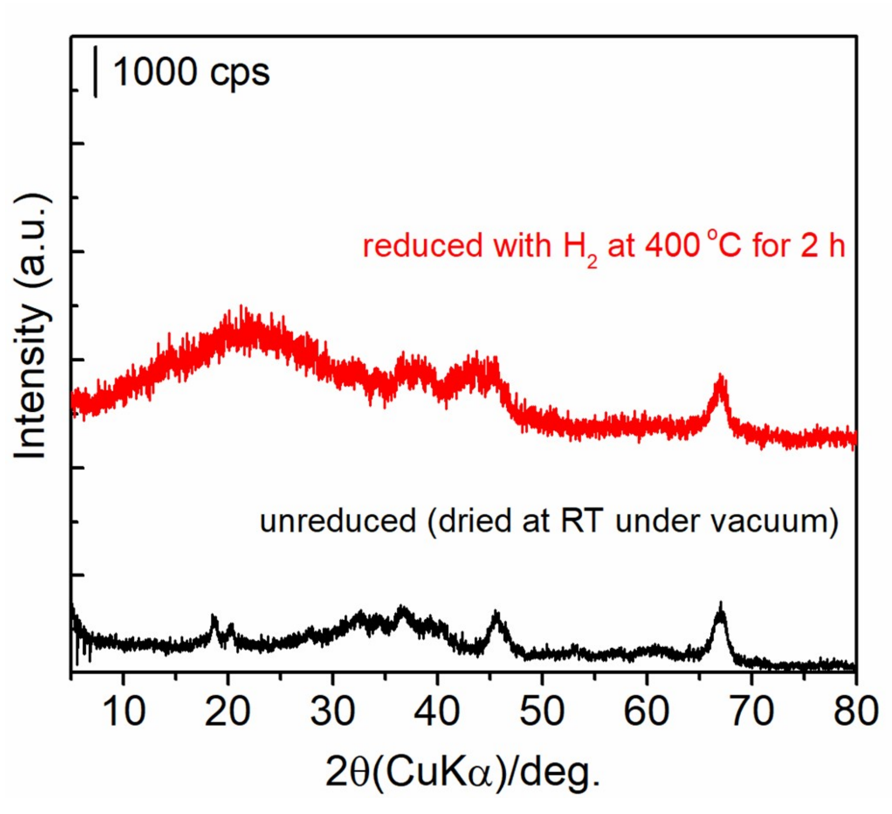

Fig. S2 XRD patterns of unreduced (as-prepared) and reduced Ru-(1.30)Sn/γ–Al_2O_3(E) samples.

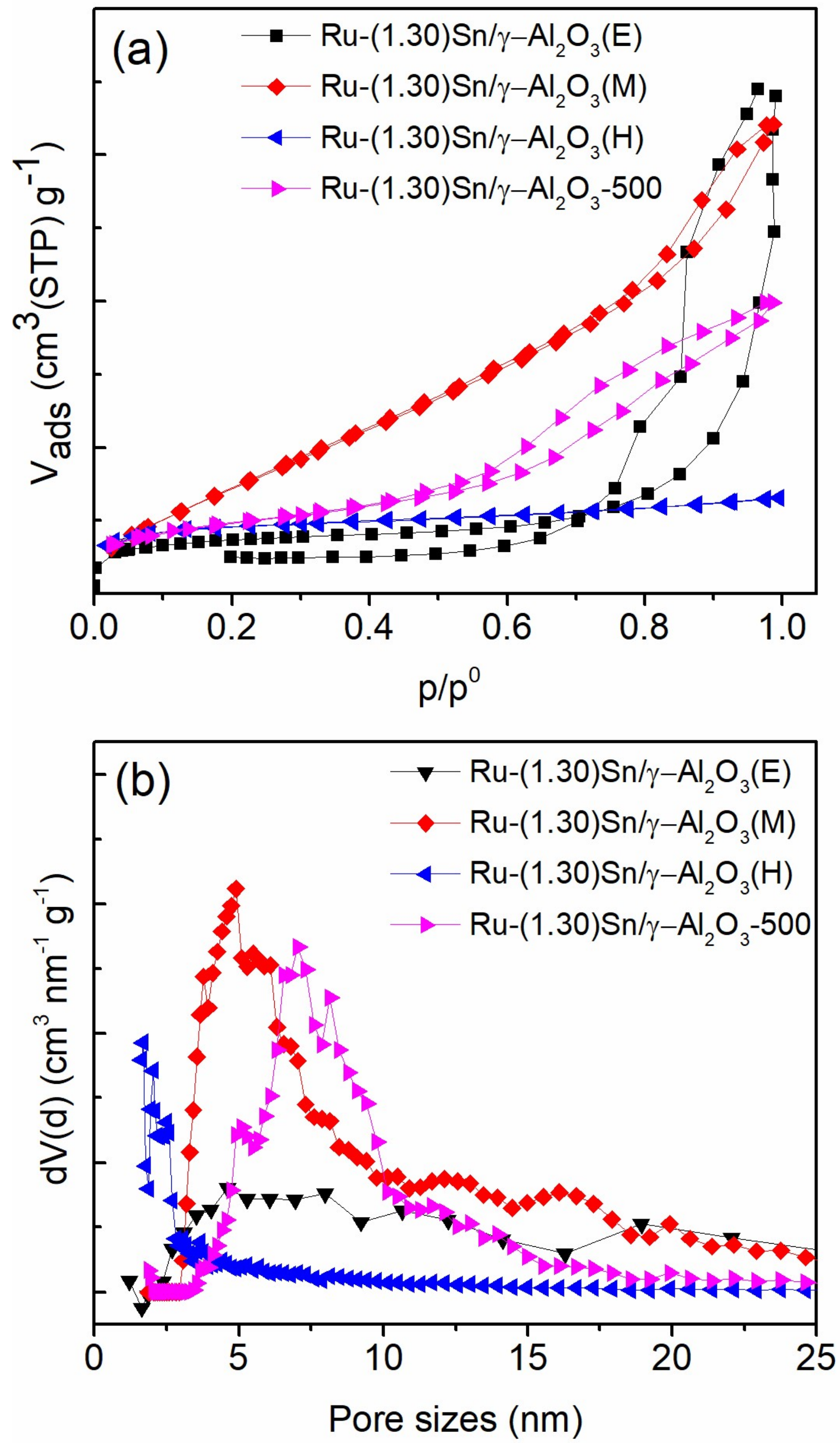

Fig. S3 (a) N_2-adsorption-desoprtion profiles and (b) pore sizes distribution determined by DFT method for four types of gamma-alumina-based supported Ru-(1.30)Sn catalysts after reduction with H_2 at 400 ^oC for 2 h.

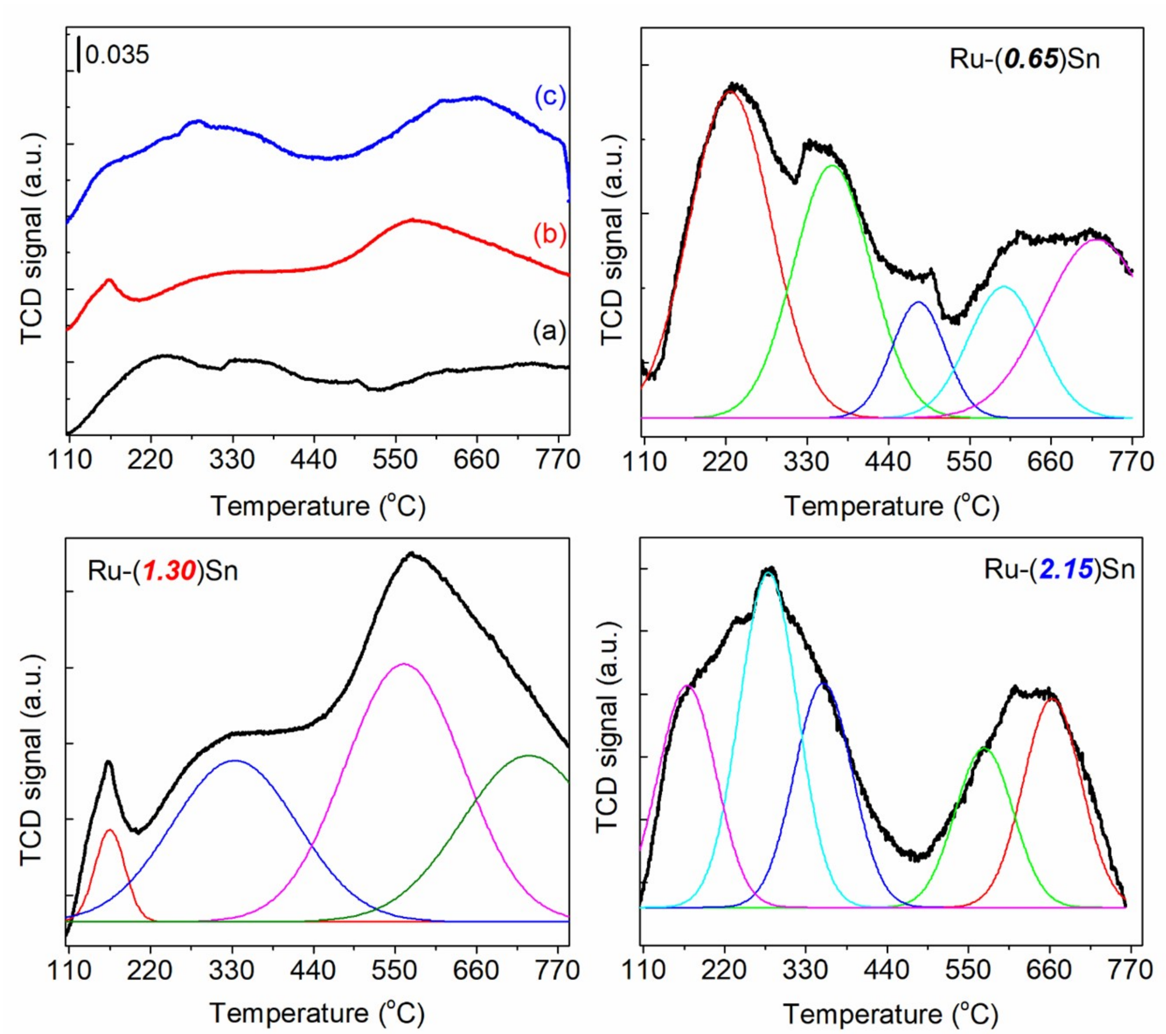

Fig. S4 NH_3-TPD profiles of Ru-(x)Sn/γ–Al_2O_3(E) and deconvoluted NH_3-TPD spectra of Ru-(0.65)Sn/γ–Al_2O_3(E), Ru-(1.30)Sn/γ–Al_2O_3(E), and Ru-(2.15)Sn/γ–Al_2O_3(E) catalysts.

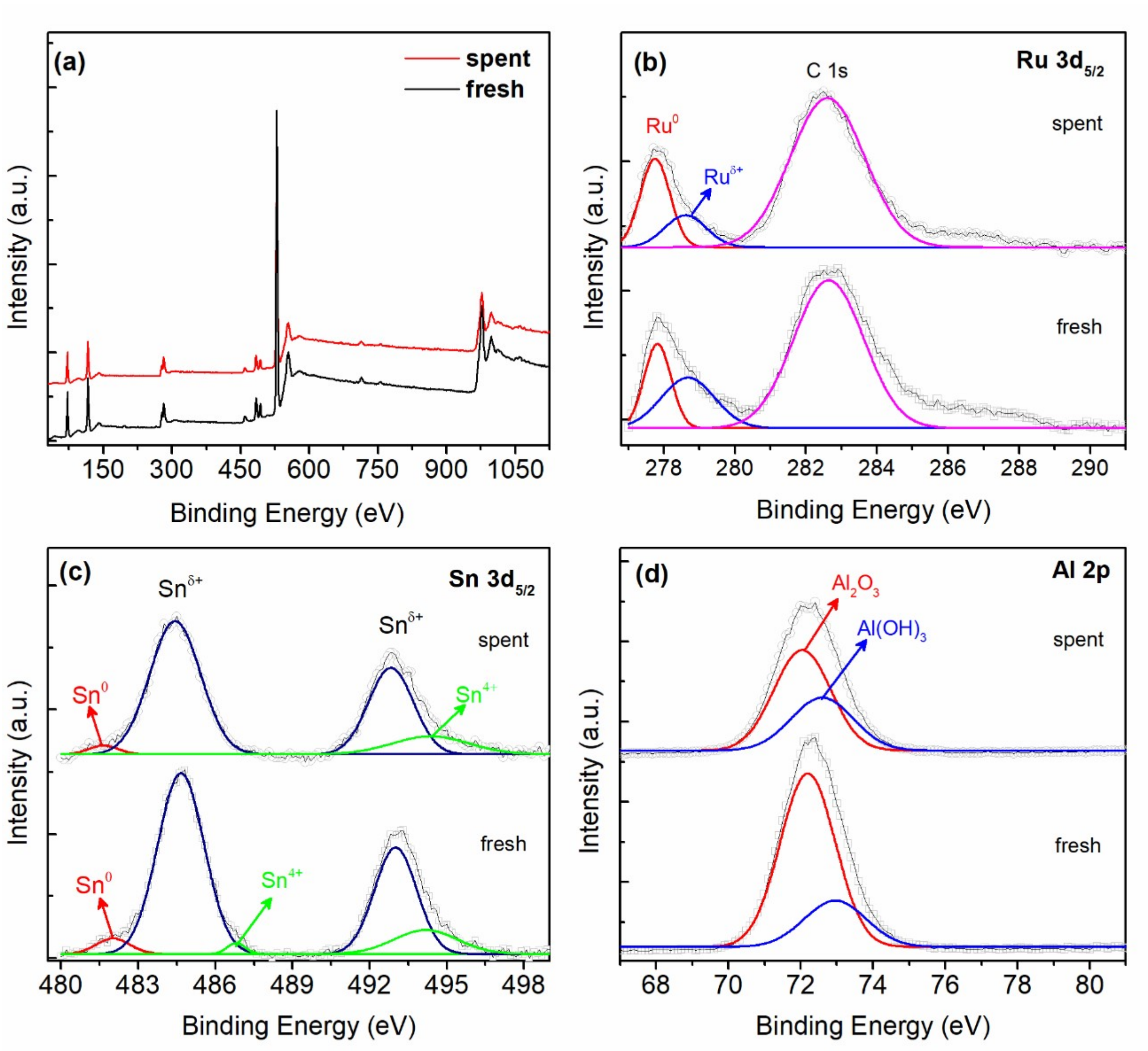

Fig. S5 XPS spectra Al 2p for fresh and spent Ru-(1.30)Sn/g-Al_2O_3(E) samples.

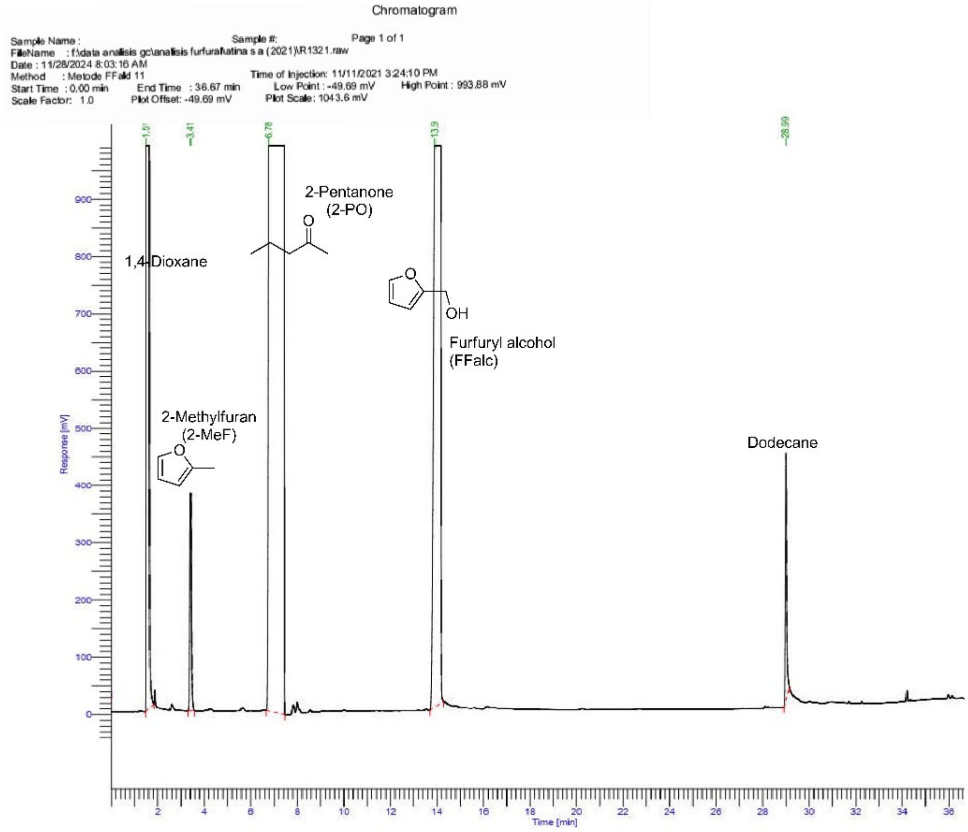

Fig. S6 GC chart (chromatogram) of reaction mixture obtained from the reaction of FFald in 1,4-dioxane using the most effective Ru-(1.30)Sn/γ–Al_2O_3 catalyst. Reaction conditions: catalyst, 50 mg; substrate (FFald), 2.0 mmol; solvent, 1,4-dioxane; 3.0-3.5 ml; initial H_2 pressure, 30 bar; 180 ^{o}C, 3 h.

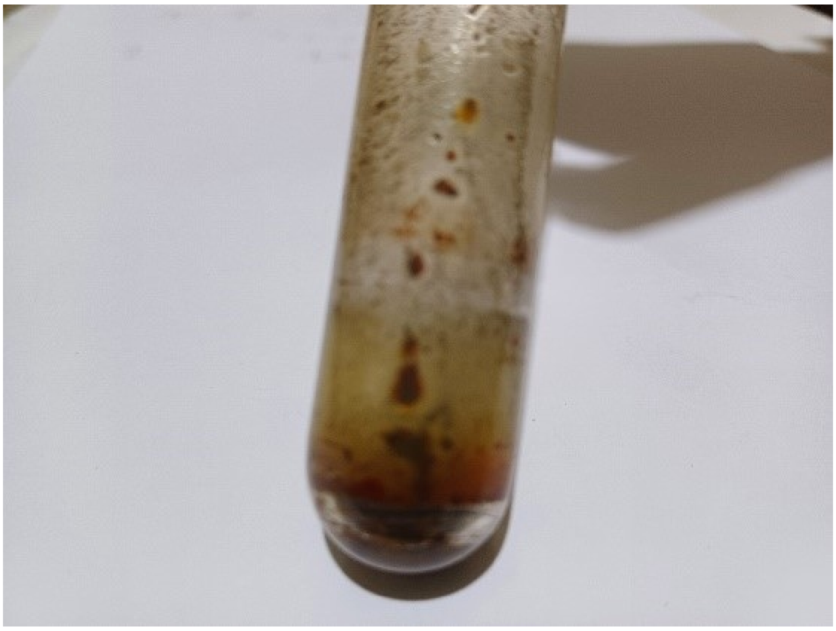

Fig. S7 Photo images of reaction mixtures obtained after the third reaction run using Ru-(1.30)Sn/γ–

Al_2O_3 catalyst.

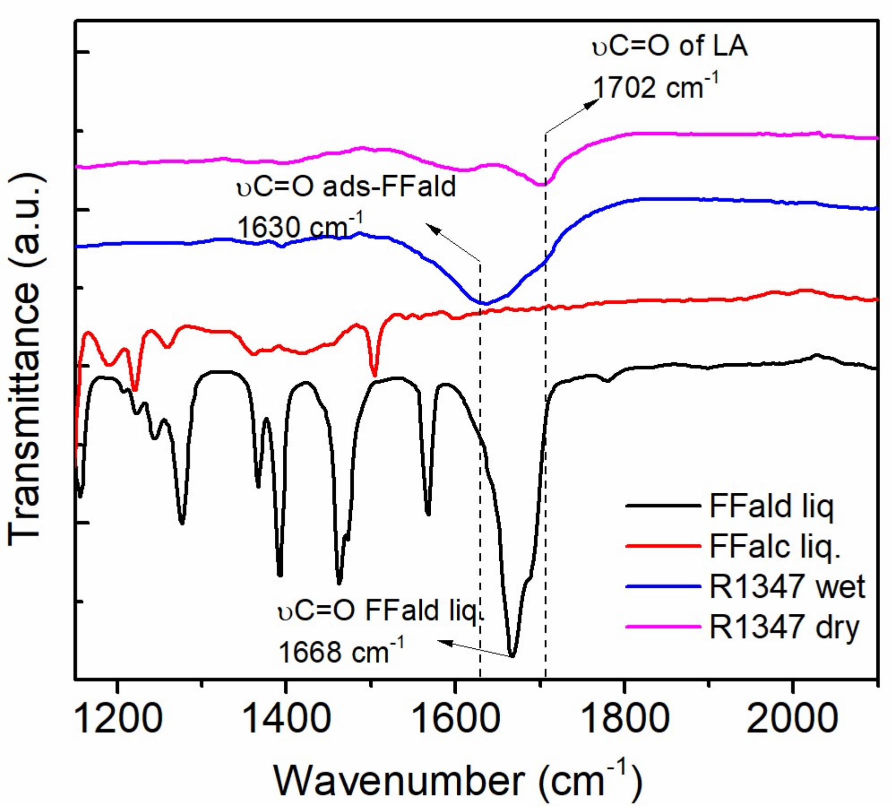

Fig. S8 ATR-IR spectra of recovered Ru-(1.30)Sn/γ–Al_2O_3(E) after the second reaction run.

Table S1. ICP analysis of typical Ru-(1.30)Sn/g-Al2O3 (E) catalyst before and after catalytic reactions

Entry	Catalyst	Bulk composition (mmol g^{-1})		
		Sn/Ru	Ru	Sn
1	Ru-(1.30)Sn/γ–Al2O3 (E)	0.30	3.70	1.11
2[b]	Ru-(1.30)Sn/γ–Al2O3 (E) (recovered	0.28	3.67	1.02

[a] Determined by ICP-AES.

[b] Recovered catalyst after reusability test.