

## SUPPLEMENTARY INFORMATION

### **REGULAR ARTICLE**

#### **Liquid phase hydrogenation of furfural using 2-propanol over ZrO<sub>2</sub>**

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### **Table of Contents**

**Table S1** Effect of ZrO<sub>2</sub> calcination temperature

**Figure S1** Effect of reaction Temperature on CTH of FF to FFA over Z-573

**Figure S2** Effect of molar ratio of FF to IPA on CTH of FF to FFA

**Figure S3** Influence of time on stream CTH of FF with IPA over Z-573

**Figure S4** Zero order kinetic plot of liquid phase furfural hydrogenation over ZrO<sub>2</sub> at 383K with varying residence time

### **Gas phase experiments**

Catalytic tests were conducted in gas phase using a fixed bed down flow glass reactor (14 mm i.d and 300 mm long) at atmospheric conditions. Typically, 1g of catalyst was mixed with 0.5g of quartz beads and placed between the two plugs of quartz wool and hanged in the isothermal zone of the reactor which was placed vertically in a electrically heated furnace. Prior to the reaction the catalyst was preheated in N<sub>2</sub> flow (30 ml/min) at 473 K for 1 h. The reactant feed with required molar ratio [1:15] of furfural and alcohol is injected continuously at flow rate of 1ml h<sup>-1</sup>. The product mixture of the reaction was collected at regular intervals in a cold trap maintained at 273 K. The obtained products were first confirmed by GCMS (QP-5050 (M/s. Shimadzu instruments, Japan) and quantified by a flame ionization detector (FID) equipped gas chromatography, GC-17A (M/s. Shimadzu Instruments, Japan) using with EB-5 MS capillary

column (30 m × 0.25 mm × 0.25 m) and confirmed by GC-MS, QP-2010 (M/s. Shimadzu Instruments, Japan).

Table S1. Effect of ZrO<sub>2</sub> calcination temperature in gas phase conversion of furfural

Catalysts	Conversion of FF (%)	Selectivity to FFA (%)
Z-573	95	98
Z-773	65	99
Z-973	50	99
ZrO <sub>2</sub> (Commercial)	60	>99

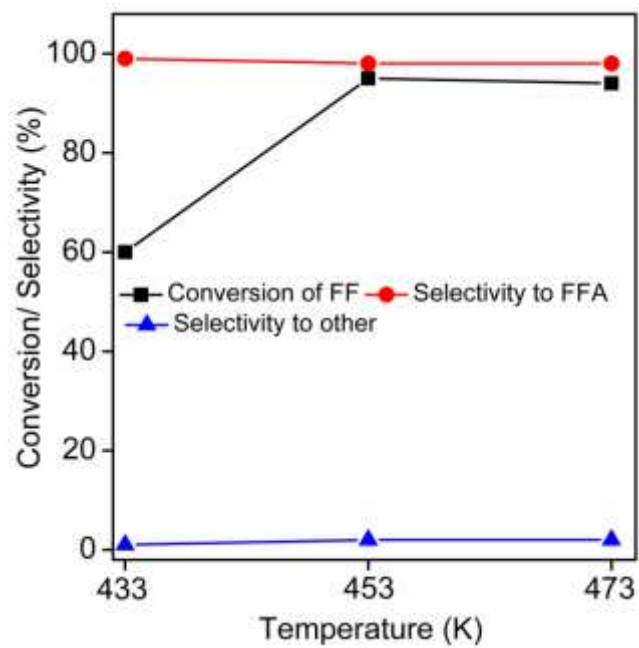


Figure S1. Effect of reaction Temperature on CTH of FF to FFA over Z-573

Reaction conditions: Feed flow = 1 ml h<sup>-1</sup>, N<sub>2</sub> flow 30 mlmin<sup>-1</sup>, FF: 2 propanol =1:15(mol/mol)

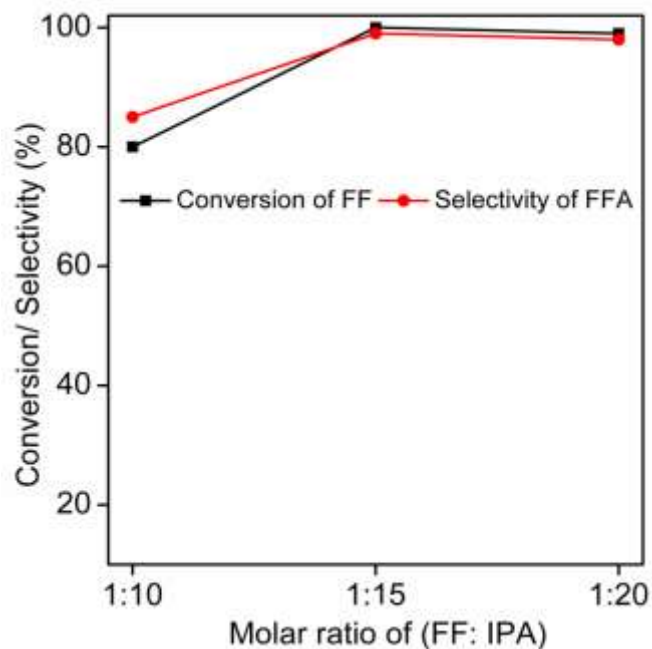


Figure S2. Effect of molar ratio of FF to IPA on CTH of FF to FFA

Reaction conditions: Feed flow = 1 ml h<sup>-1</sup>, N<sub>2</sub> flow 30 mlmin<sup>-1</sup>, temperature: 453K

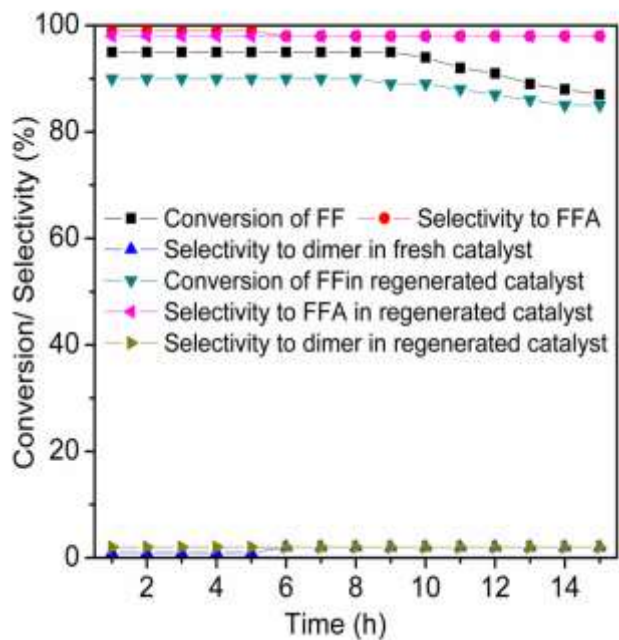


Figure S3. Influence of time on stream CTH of FF with IPA over Z-573

Reaction conditions: Feed flow = 1 ml h<sup>-1</sup>, N<sub>2</sub> flow 30 mlmin<sup>-1</sup>, temperature: 453K, FF: 2 propanol =1:15(mol/mol)

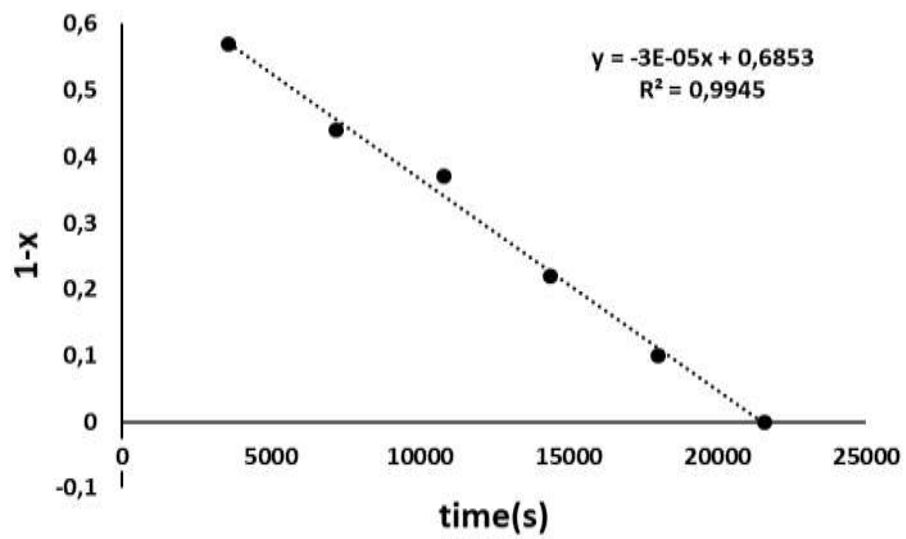


Figure S4. Zero order kinetic plot of liquid phase furfural hydrogenation over  $ZrO_2$  at 383K with varying residence time