

Supporting Information

Direct conversion of glycerol to *n*-propanol over tandem catalytic dehydration-hydrogenation system

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Table S1 Conversion and products yields over the tandem catalytic system

Entry	Catalysts		W/F ($\text{g}\cdot\text{h}\cdot\text{mol}^{-1}$)	Reaction Temperature ($^{\circ}\text{C}$)	Glycerol Conversion (%mol)	Acrolein Conversion ^a (%mol)	Yield (%mol)							<i>n</i> -Propanol Hydrogenation Selectivity ^b	
	Top bed	Bottom bed					Acrolein	Hydroxyacetone	Propionaldehyde	<i>n</i> -Propanol	Propanoic acid	Acetaldehyde	Ethanol		Acetic Acid
1	HZSM-5	20Ni/SiO ₂	177 59	300 150	100	98.1	1.5	10.2	36.7	38.1	6.0	-	2.4	5.1	46
2	HZSM-5	20Ni/SiO ₂	177 59	300 200	100	100	-	2.6	11.4	48.1	4.5	-	1.6	4.3	58
3	HZSM-5	20Ni/SiO ₂	177 59	300 300	100	100	-	-	7.4	13.8	3.4	-	1.3	3.2	17

(Reaction conditions: 10wt.% glycerol solution, 100 mL/min of H₂, 1 atm. The activity is at 1 h on stream.)

^a Estimated from acrolein produced by the first catalytic bed.

^b *n*-Propanol selectivity based on hydrogenation of acrolein/propionaldehyde produced from the first bed.

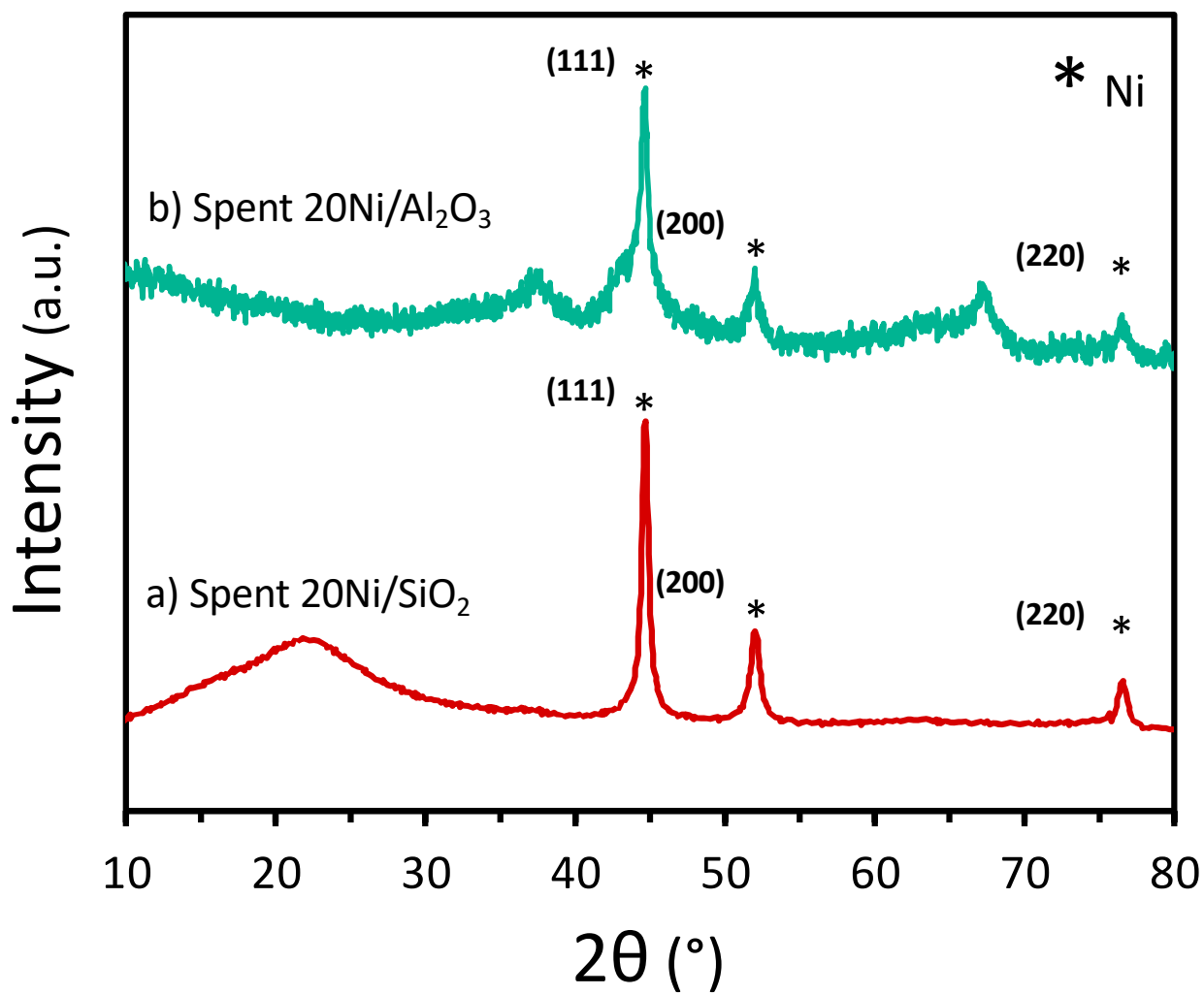


Fig. S1 XRD patterns of supported Ni catalysts after reaction.

Table S2 Ni content of fresh and spent catalysts

Catalysts	Ni Content ^a (wt.%)	
	Fresh	Spent
20Ni/SiO ₂	21.1	21.0
20Ni/Al ₂ O ₃	22.0	21.9

^a Determined by XRF analysis.

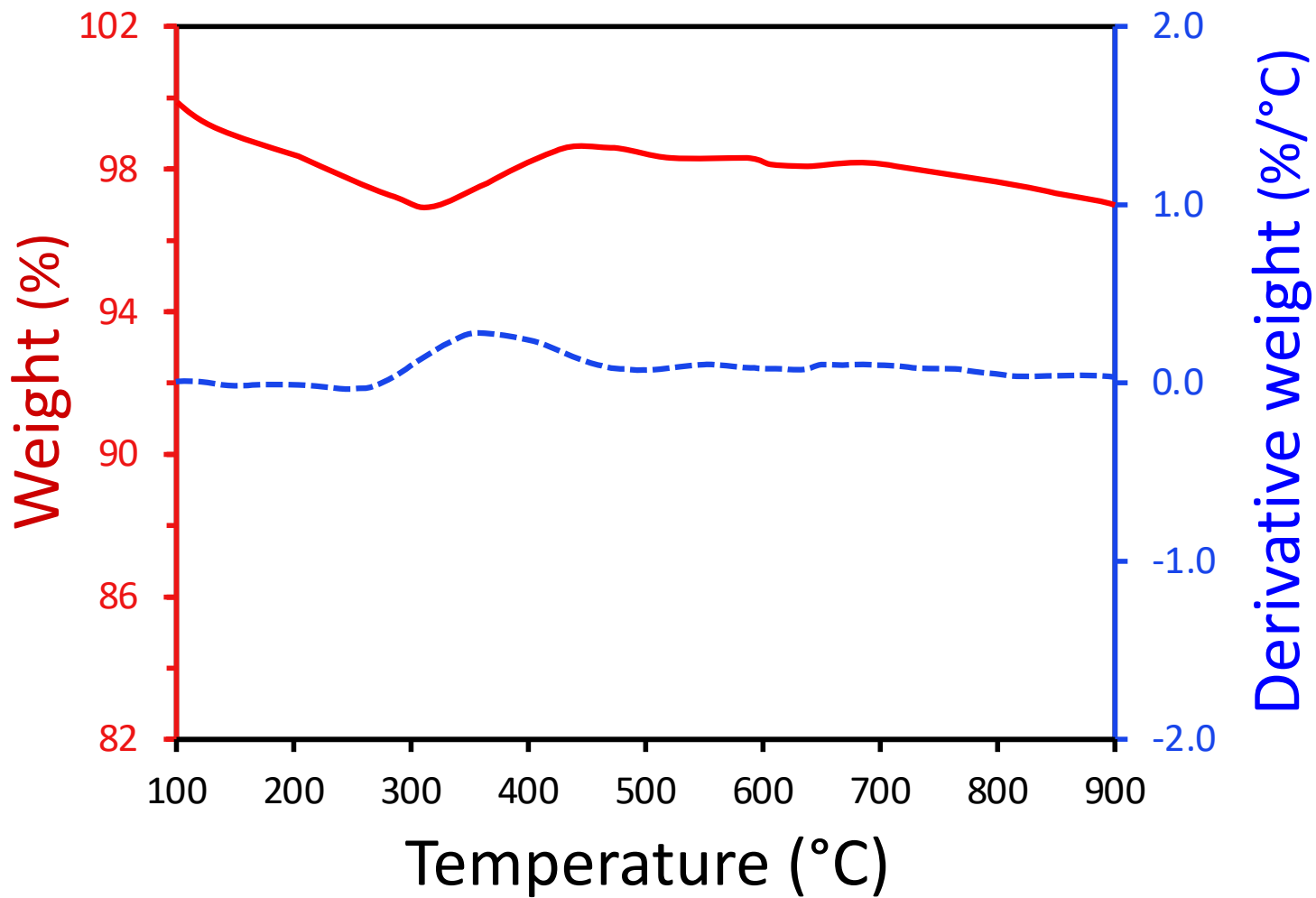


Fig. S2 TGA and DTG thermogram of spent 20Ni/Al₂O₃ catalyst.

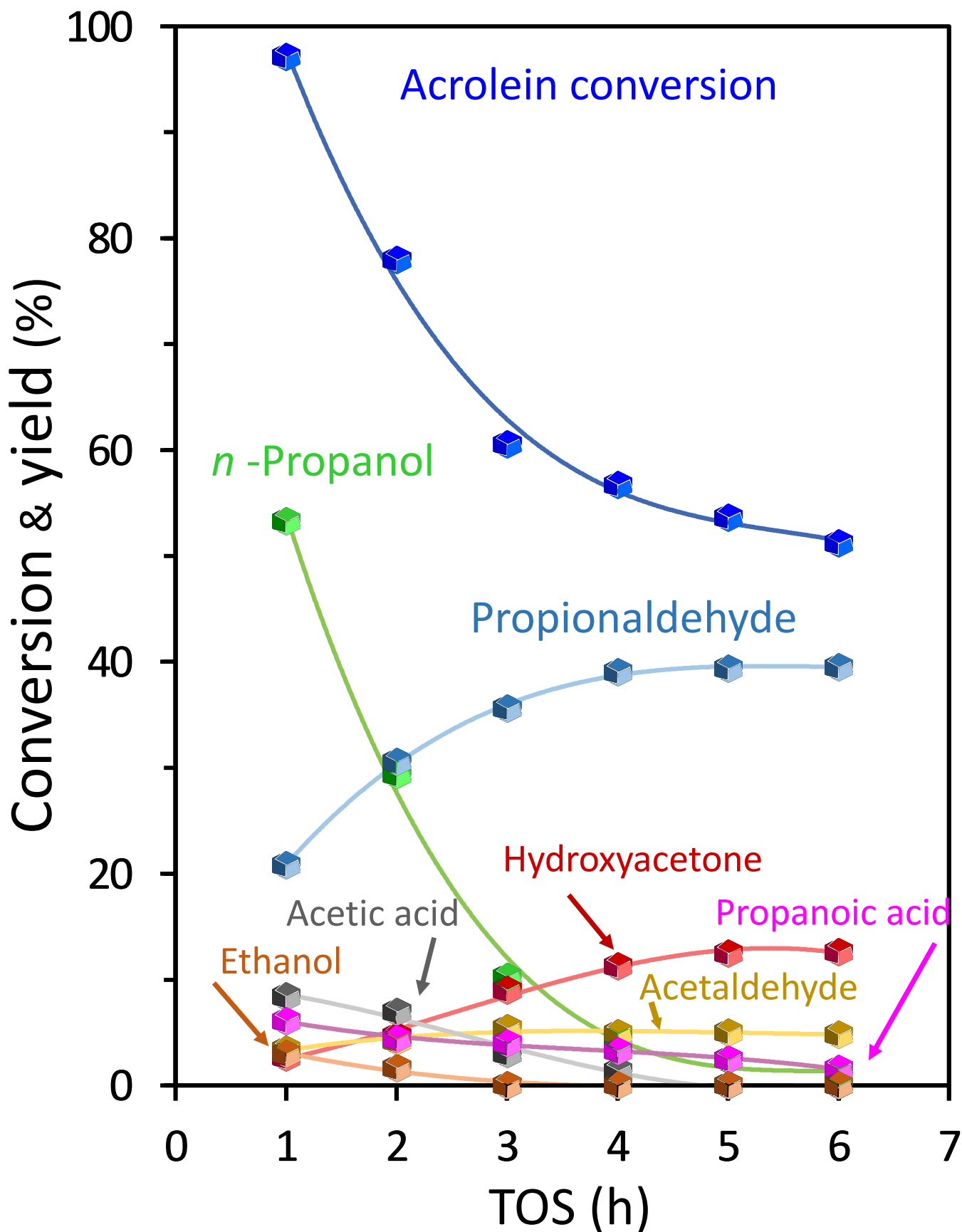


Fig. S3 The reaction of glycerol over HZSM-5|20Ni/Al₂O₃. (Reaction conditions: 10wt.% glycerol, W/F 177|30 g·h·mol⁻¹, 100 mL/min of H₂, 1 atm, 300|175 °C) Note: 100% glycerol conversion over the first catalytic bed.