

Supplementary Information for:

The Electrocatalytic Hydrogenation of Furanic Compounds in a Continuous Electrocatalytic Membrane Reactor

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Table 1 Selectivity towards furfuryl alcohol (FA), tetrahydrofurfuryl alcohol (THFA), 2-methylfuran (MF), and 2-methyltetrahydrofuran (MTHF) from the electrocatalytic hydrogenation of furfural in a continuous electrocatalytic membrane reactor using protons generated from either water electrolysis or hydrogen gas. Reaction conditions: 30°, cathode: 111.7 WHSV furfural over 1.0 mg/cm² Pt/C, anode: H₂O at 0.6 ml/min or 30 sccm H₂ over 4.0 mg/cm² Pt-Ru/C.

Power Input (W)	Selectivity (%)							
	FA		THFA		MF		MTHF	
	H ₂ O	H ₂	H ₂ O	H ₂	H ₂ O	H ₂	H ₂ O	H ₂
0.044	76.6±7.73	58.5±1.39	6.6±4.49	31.1±0.71	10.3±11.93	5.1±0.05	6.5±3.79	5.4±0.32
0.062	-	60.9±0.45	-	22.4±1.12	-	12.2±0.56	-	4.5±0.11
0.089	-	65.8±0.33	-	20.3±0.68	-	10.1±0.32	-	3.8±0.04
0.106	69.6±4.97	-	11.8±6.94	-	8.9±7.76	-	9.7±5.59	-

Table 2 Rate of furfural conversion and product selectivity for the electrocatalytic hydrogenation of furfural in a continuous electrocatalytic membrane reactor using protons generated from water electrolysis both with and without hydrogen gas sparged at the cathode inlet. Reaction conditions: 30°, 0.061W, cathode: 111.7 WHSV furfural over 1.0 mg/cm² Pt/C, anode: H₂O at 0.6 ml/min over 4.0 mg/cm² Pt-Ru/C. Hydrogen gas was sparged at the cathode inlet for 10 minutes prior to starting the reaction to ensure saturation. The flow of hydrogen was sufficiently low to ensure no gas bubbles entered the reactor.

	Furf. Conversion Rate (moles/moles Pd min)	Selectivity (%)			
		FA	THFA	MF	MTHF
Without H ₂ Sparge	0.55±0.02	85±6.81	8.36±2.84	2.64±0.29	4.48±4.25
With H ₂ Sparge	0.52±0.04	87±5.47	8.20±3.88	2.84±1.15	2.08±0.45