Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Materials

Efficient conversion of furfuryl alcohol to ethyl levulinate with sulfonic acid-functionalized MIL-101(Cr)

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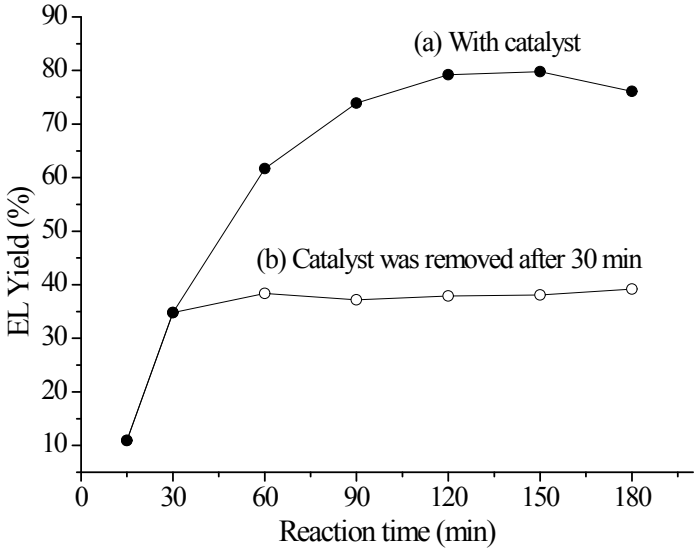
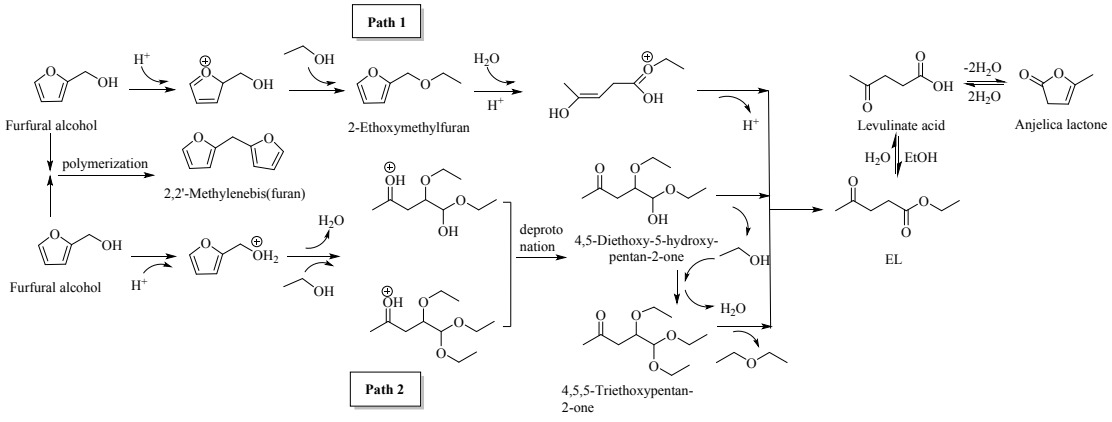


Fig. S1. EL yield profiles of the reaction solution (a) with MIL-101(Cr)-SO_3H catalyst or (b) without MIL-101(Cr)-SO_3H catalyst (filtrated after 30 min). (Reaction conditions: molar ratio of FA to EtOH =1:60, MIL-101(Cr)-SO_3H (100 mg), 140 ºC)



Scheme S1 Proposed reaction pathway for the acid-catalyzed conversion of furfuryl

alcohol to ethyl levulinate in EtOH.

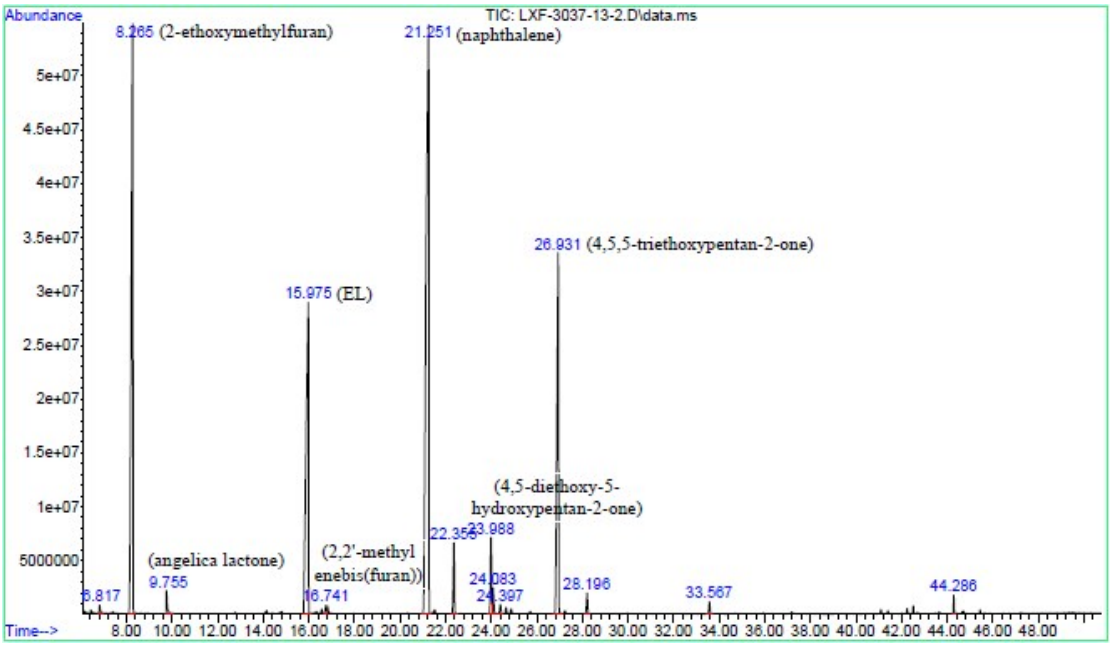
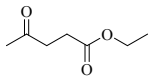
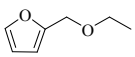
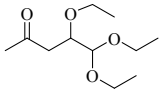
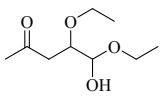
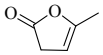
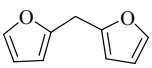
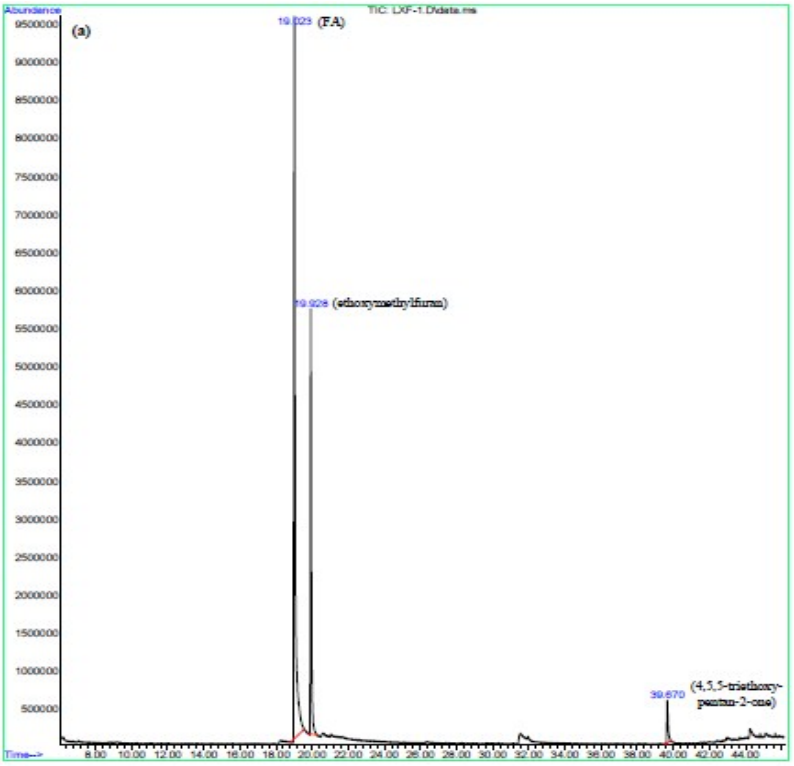


Fig. S2. The intermediates and byproducts identified by GC-MS during the course of the one-pot ethanolysis reaction. (Reaction conditions: molar ratio of FA to EtOH =1:60, MIL-101(Cr)-SO_3H (100 mg), 120 ºC)

Table S1 The intermediates and byproducts identified by GC-MS during the course of the one-pot ethanolysis reaction. (Reaction conditions: molar ratio of FA to EtOH =1:60, MIL-101(Cr)-SO_3H (100 mg), 120 ºC)

Molecular structure	Name of compound	Retention time	Products	Relative amount (%)
	Ethyl levulinate	15.975	Main product	28.8
	2-(Ethoxymethyl)furan (2-EMF)	8.265	Intermediate	36.9
	4,5,5-Triethoxypentan-2-one (TEP)	26.931	Intermediate	22.7
	4,5-Diethoxy-5-hydroxypentan-2-one (DHP)	23.988	Intermediate	3.5
	Angelica lactone	9.755	Byproduct	1.0
	2,2’-Methylenebis(furan)	16.741	Byproduct	0.3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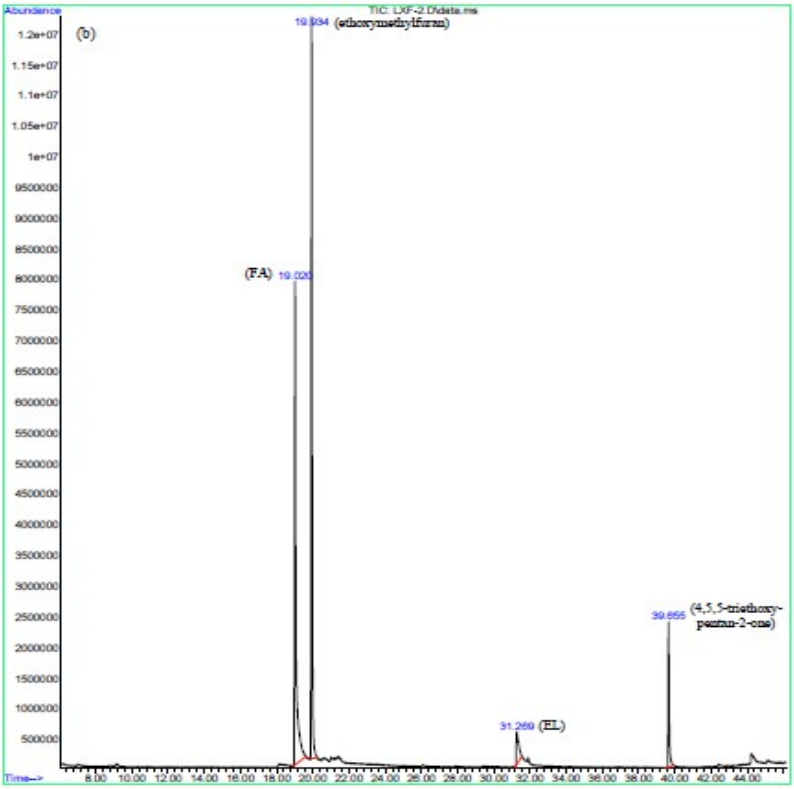
(a)
19.023 (FA)
19.926 (ethoxymethylfuran)
39.670 (4,5,5-triethoxy-pentan-2-one)
Abundance
Time-->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(b)
19.934 (ethoxymethylfuran)
(FA) 19.020
39.655 (4,5,5-triethoxy-pentan-2-one)
31.269 (EL)
Abundance
Time-->

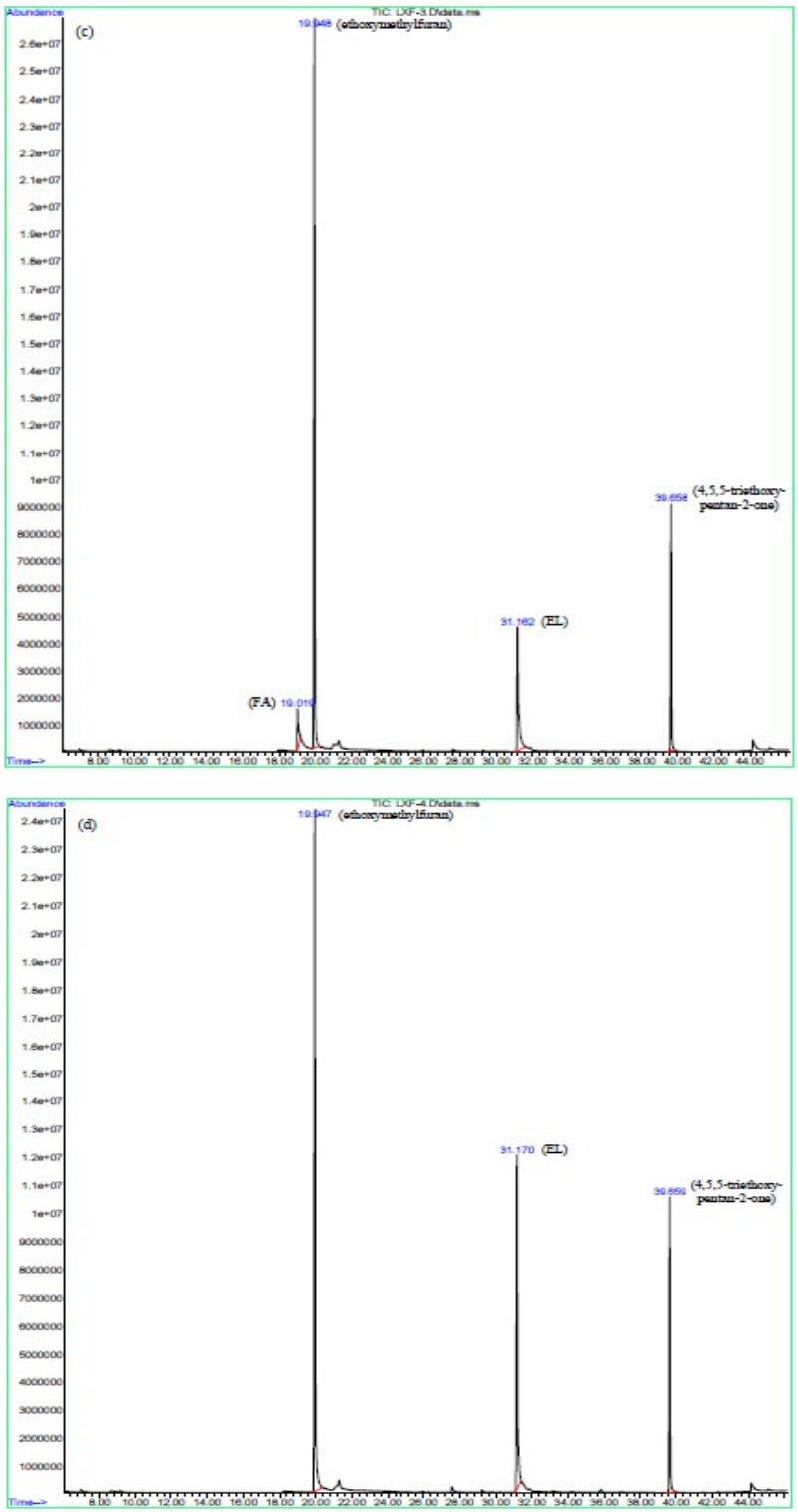

Fig. S3. GC-MS spectra of the intermittent sampling reaction mixture: GC spectrum with main retention time at 120 °C for 15 min (a), GC spectrum with main retention time at 120 °C for 30 min (b), GC spectrum with main retention time at 120 °C for 60 min (c), GC spectrum with main retention time at 120 °C for 120 min (d). (Reaction conditions: molar ratio of FA to EtOH =1:60, MIL-101(Cr)-SO_3H (100 mg), 120 ºC)