Supporting Information

Concentrated levulinic acid production from sugarcane molasses

Shimin Kang[1], Jinxia Fu[2], Naifu Zhou[1], Ribo Liu[1], Zhezhe Peng[1], Yongjun Xu[1*]

[1]School of Chemical Engineering and Energy Technology, Dongguan University of Technology, Donguan, China

[2]Hawaii Natural Energy Institute, University of Hawaii, Honolulu, HI, USA

*Corresponding author email: xuyj@dgut.edu.cn

This supporting information contains:

4 Figures

2 Tables

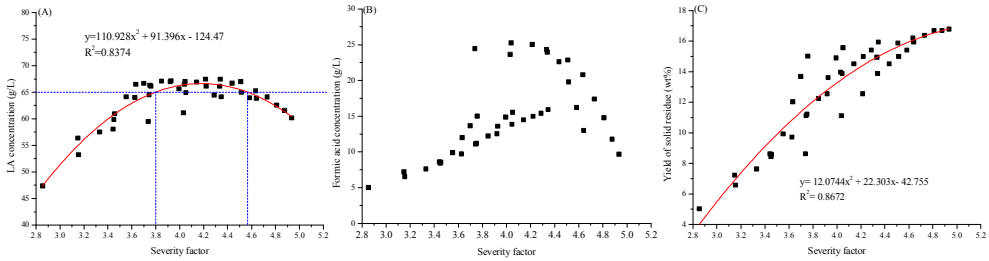

Figure S1. Impacts of severity factor at reaction conditions of 150-190 ^{o}C, 1-8 h, in 0.2 mol/L H_2SO_4 solution: (A) influence of severity factor on LA concentration; (B) influence of severity factor on formic acid concentration; (C) influence of severity factor on solid residue yield.

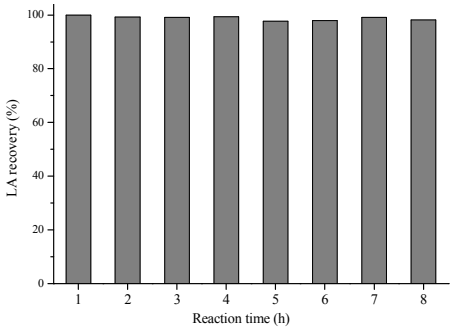

Figure S2. The stability of LA in the pure acidic solution (0.2 mol/L H_2SO_4) at 180 ^{o}C.

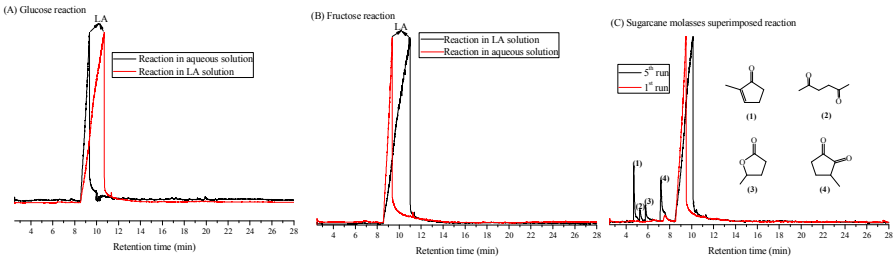

Figure S3. GC-MS chromatogram of glucose, fructose and sugarcane molasses hydrolysis products obtained at 180 °C for 3 h with 0.2 mol/L H_2SO_4. (A) glucose (100 g/L) in aqueous solution or in 150 g/L LA solution; (B) fructose (100 g/L) in aqueous solution or in 150 g/L LA solution; (C) the 1st and 5th run of the superimposed reactions for sugarcane molasses hydrolysis.

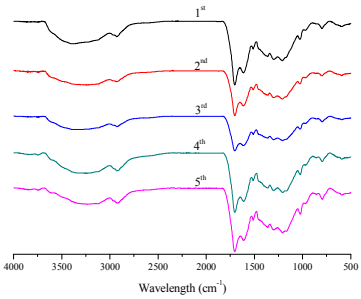

Figure S4. FT-IR spectra of the solid residues obtained from the superimposed reactions.

Table S1. Properties and constituents of sugarcane molasses.

Color	Density	pH	Water	Sucrose	Glucose	Fructose	Proteins	Ash	Others
Black	1.31 g/mL	5.6	26.9 wt%	44.4 wt%	5.1 wt%	5.0 wt%	1.3 wt%	5.4 wt%	11.9 wt%

Table S2. Influence of old LA and formic acid in the glucose solution (100 g/L) on LA formation at 180 ^{o}C after 3 h reaction with the presence of 0.2 M H_2SO_4

Reaction conditions	Newly formed LA yield (wt%)	Formic acid yield (wt%)	Solid residue yield (wt%)
Glucose solution	37.8	17.0	15.1
Glucose solution containing LA (100 g/L)	34.9	16.0	18.7
Glucose solution containing LA (135 g/L)	26.8	14.1	19.0
Glucose solution containing LA (150 g/L)	24.5	13.6	19.9
Glucose solution containing formic acid (45 g/L)	33.6	-	18.1