THE EFFECT OF CONTINUOUS TUBULAR REACTOR TECHNOLOGIES ON THE PRETREATMENT OF LIGNOCELLULOSIC BIOMASS AT PILOT-SCALE FOR BIOETHANOL PRODUCTION

ELECTRONIC SUPPLEMENTARY INFORMATION (ESI)

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Feedstock	Untreated	Pretreatment		
		Low (L)	Medium (M)	High (H)
Agave bagasse				
Corn stover				
Sugarcane bagasse				
Wheat straw				

Figure S1. Macroscopic effect on different feedstocks pretreated using PCTR at residence times of 20, 35, and 54 min [low (L), medium (M) and high (H) respectively].

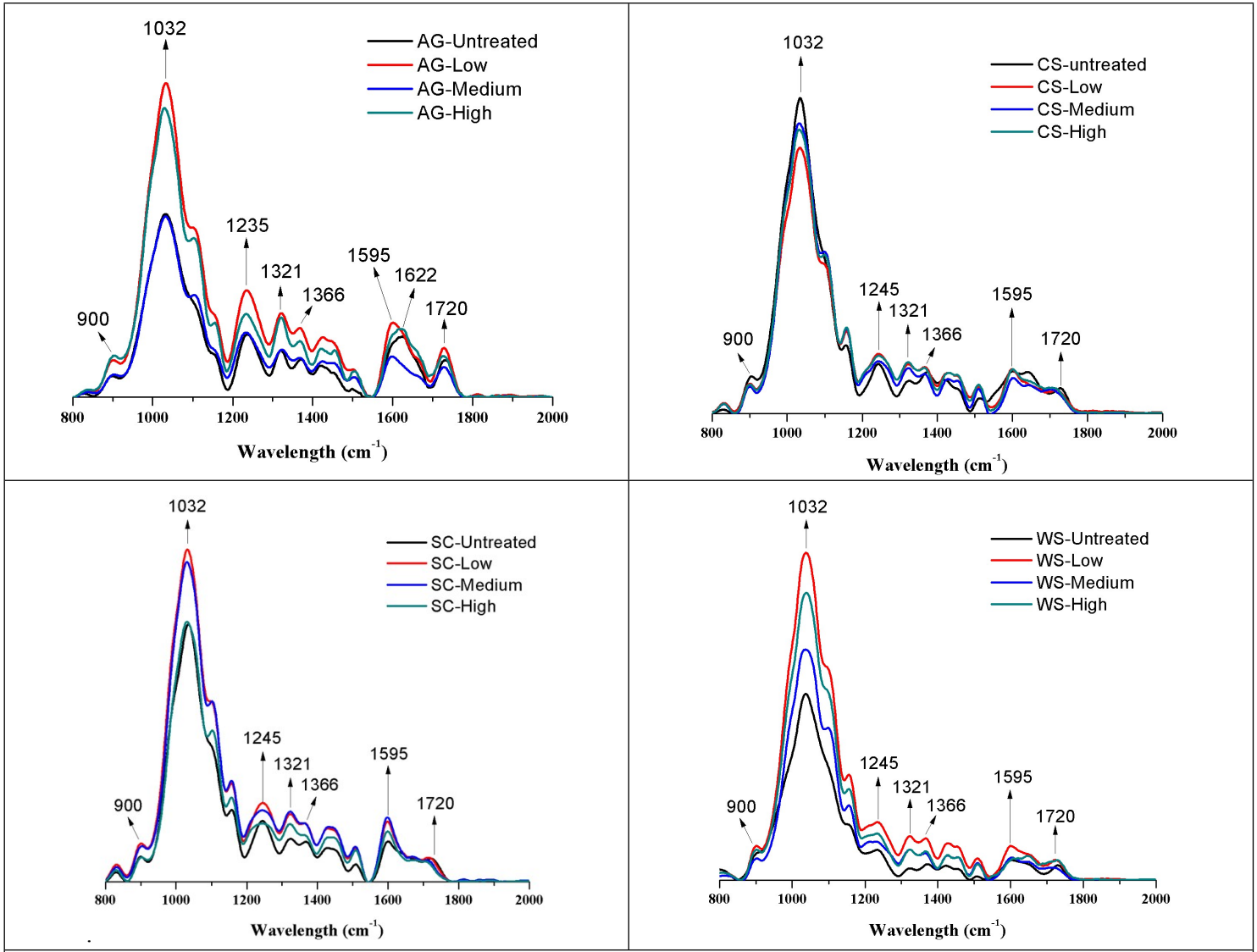

Figure S2. FTIR spectra of agave bagasse (AG), corn stover (CS), sugarcane bagasse (SC) and wheat straw (WS) untreated and after pretreatment PCTR at residence times of 20, 35, and 54 min (i.e low, medium, and high)

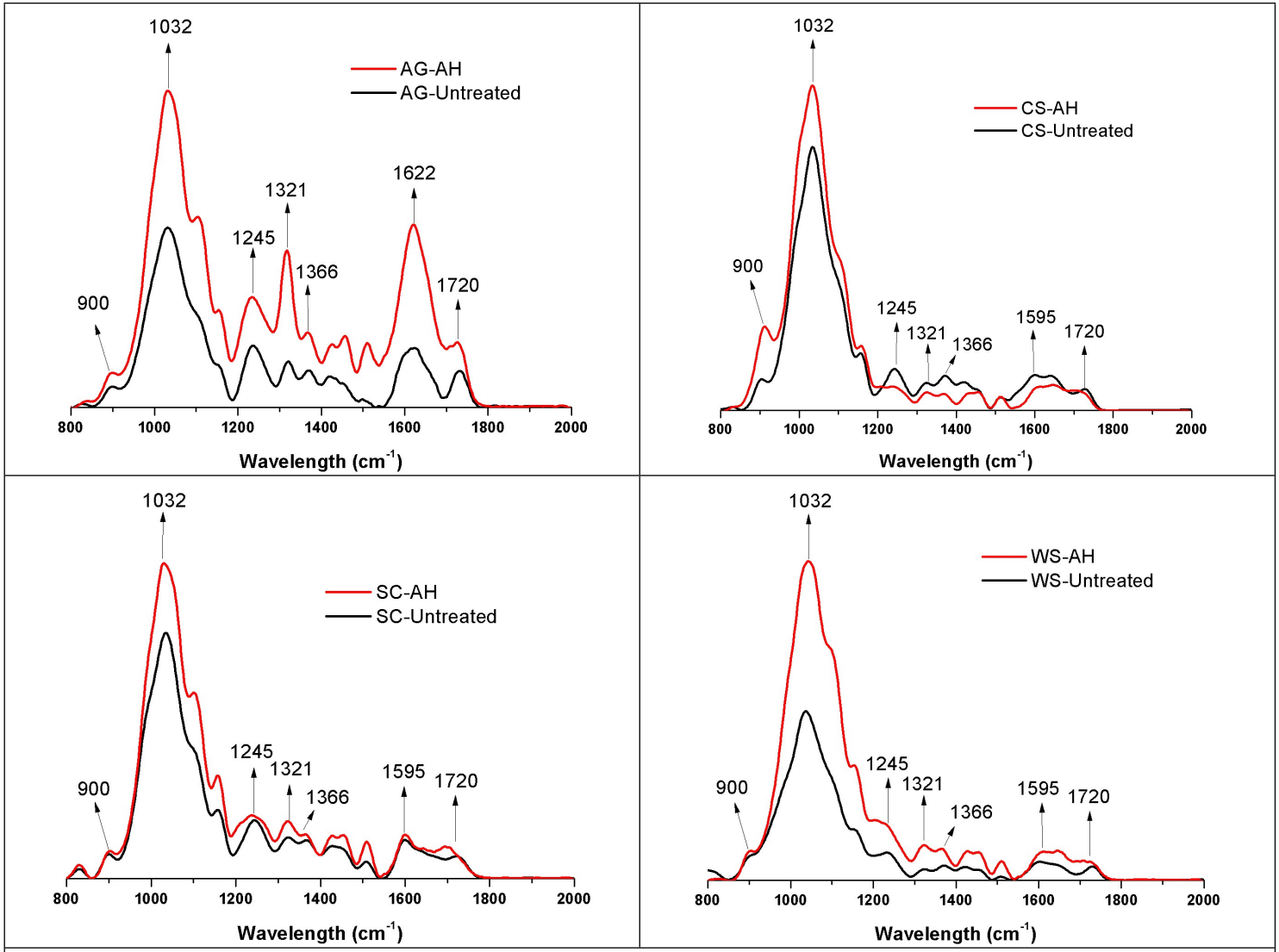

Figure S3. FTIR spectra of agave bagasse (AG), corn stover (CS), sugarcane bagasse (SC) and wheat straw (WS) untreated and after BLR pretreatment

Table S1. FTIR band assignment.

Band position	Assignment
900	Anti-symmetric out of plane ring stretch of amorphous cellulose
1032	C-O stretching in cellulose & hemicellulose
1235	C=O deformation in cellulose & hemicellulose
1245	C-O adsorption (resulting from acetyl groups cleavage)
1321*	C=O stretching of calcium oxalate
1366	C-H deformation in cellulose & hemicellulose
1595	Aromatic ring stretch
1622*	C-O stretching of calcium oxalate
1720	Carbonyl (C=O) stretching

*Only for agave bagasse.

Table S2. Comparison of sugar and ethanol yields of PCTR-pretreated biomass using SSF with a total process time of 96 h.

Feedstock	Glucose[a]	Xylose[a]	Ethanol[b]	Y_E (%)	$Q_{EtOH\ 24\ h}$ (g_{EtOH}/L h)
	g/L				
AG	77.2±5.1	22.5±1.3	37.6±0.6	60.7±0.9	1.38±0.02
CS	87.5±1.9	29.8±0.9	40.4±0.5	60.0±0.7	1.51±0.03
SC	73.6±2.7	18.0±0.7	36.3±2.1	46.0±2.7	1.30±0.03
WS	92.9±1.0	25.1±0.5	41.6±0.5	60.6±0.7	1.59±0.03

[a] 1st stage: saccharification (24 h)

[b] 2nd stage: fermentation (72 h)

Ethanol yield based on the glucan content in the pretreated material as % of the theoretical.

$Q_{EtOH\ 24\ h}$ = volumetric productivity of ethanol at 24 h elapsed fermentation time.

Error bars show standard deviation of triplicate measurements.