Electronic Supplementary Material (ESI) for Green Chemistry.
This journal is © The Royal Society of Chemistry 2020

SUPPORTING INFORMATION

Producing High Yield of Levoglucosan by Pyrolyzing Non-thermal Plasma-Pretreated Cellulose

Lusi A[1], Haiyang Hu[2], Xianglan Bai[1]*

[1]Department of Mechanical Engineering, Iowa State University, Ames, IA 50011 USA

[2]Department of Aerospace Engineering, Iowa State University, Ames, IA 50011 USA

*Corresponding author, Email: bxl9801@iastate.edu

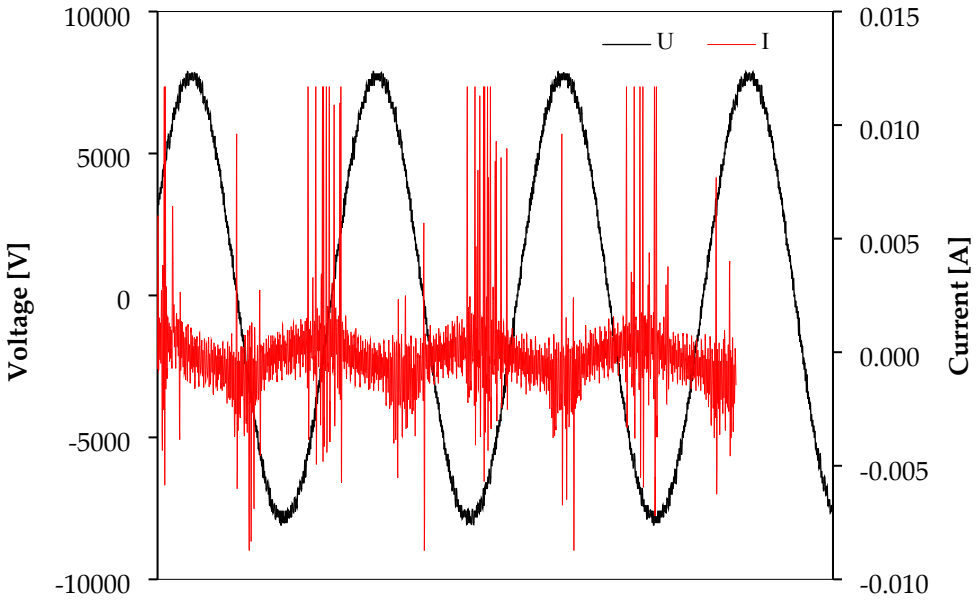


Fig S1. Voltage-current graph during plasma treatment

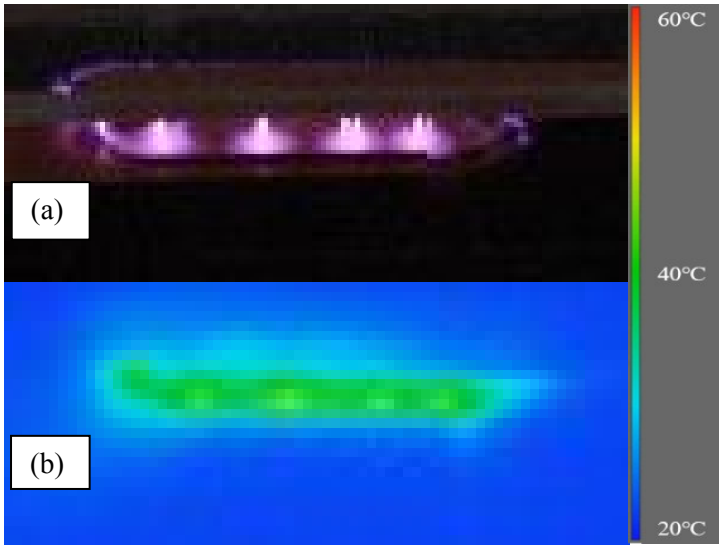
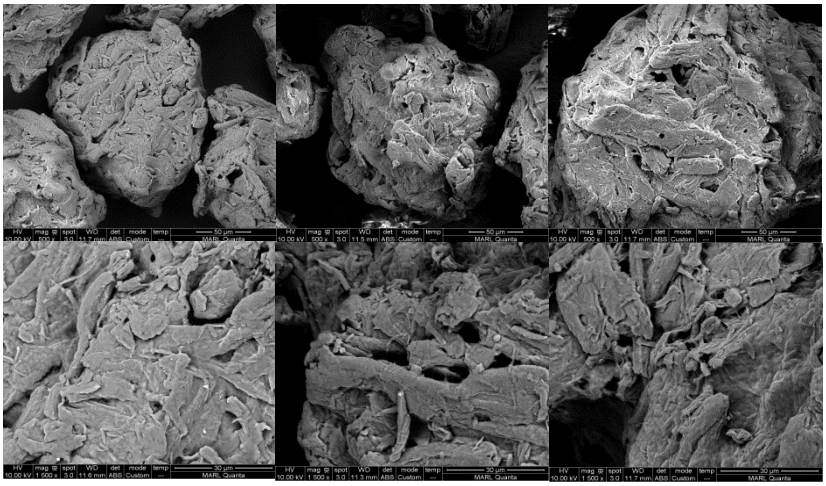


Fig S2 (a). Snapshot of cellulose under plasma treatment; (b). IR thermographic image for temperature distribution after 5 min. The temperature scale is shown in the right side bar.



Untreated Ar plasma Air plasma

Fig S3. SEM images of the untreated and plasma-pretreated cellulose. The AC power condition and pretreatment time are f = 17.5 kV, V = 2 kHz and t = 30 s for the Ar plasma-treated cellulose, and f = 15 kV, V = 2 kHz and t = 30s for the air plasma-treated cellulose.

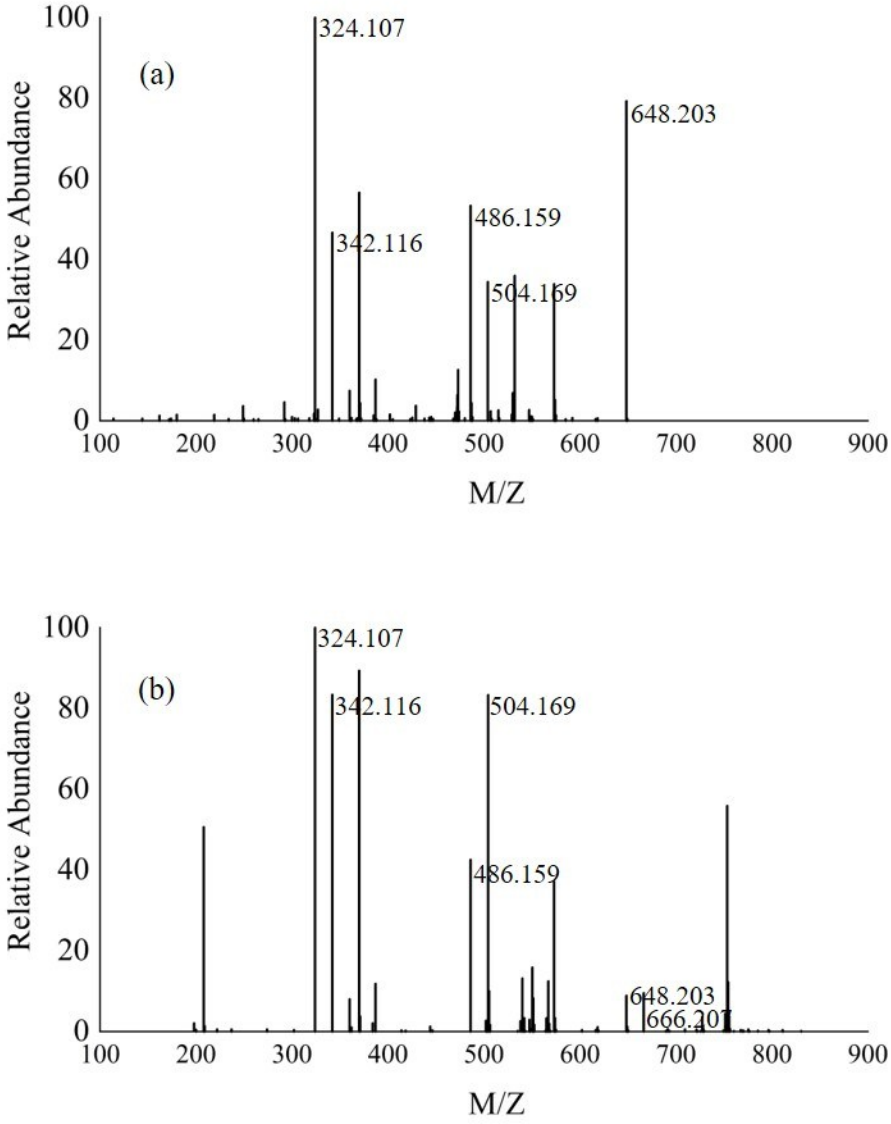


Fig S4. LC-MS results of the water-soluble fractions of the plasma pretreated cellulose. (a). the Air plasma pretreated cellulose, (b). the Ar plasma pretreated cellulose. (Plasma pretreatment conditions are f = 17.5 kV, V = 2 kHz and t = 30s for the Ar plasma, and f = 15 kV, V = 2 kHz and t = 30 s for the air plasma.)

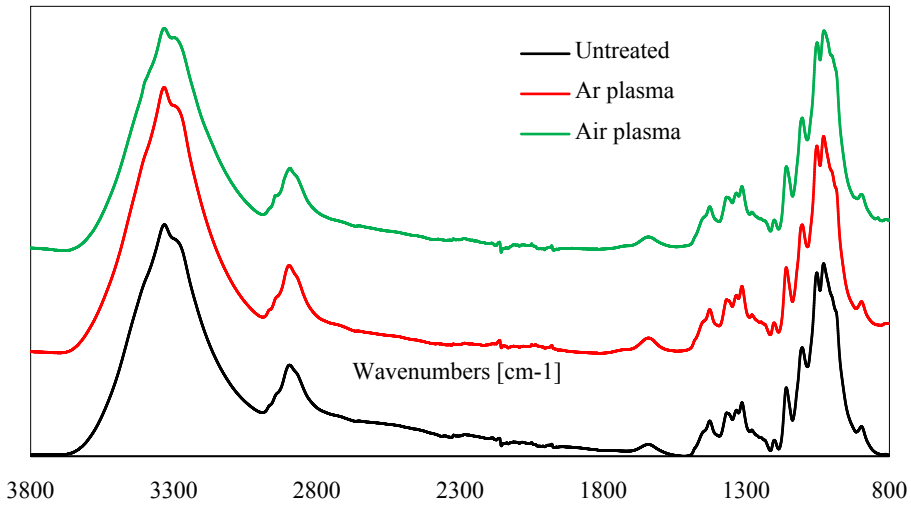


Fig S5. FTIR spectra of the untreated and plasma-pretreated cellulose. (Plasma pretreatment conditions are f = 17.5 kV, V = 2 kHz and t = 30 s for the Ar plasma, and f = 15 kV, V=2 kHz and t = 30 s for the air plasma.)

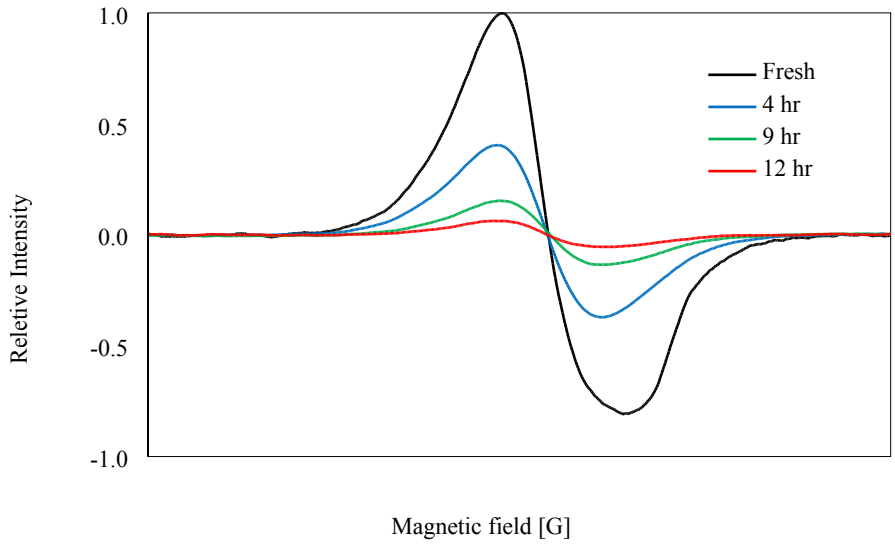


Fig S6. EPR spectra of the air plasma-pretreated cellulose stored at ambient air for various times. The "Fresh" sample was analyzed within 30 min after the plasma treatment. (Plasma pretreatment conditions: f = 15 kV, V = 2 kHz, t = 30 s.)

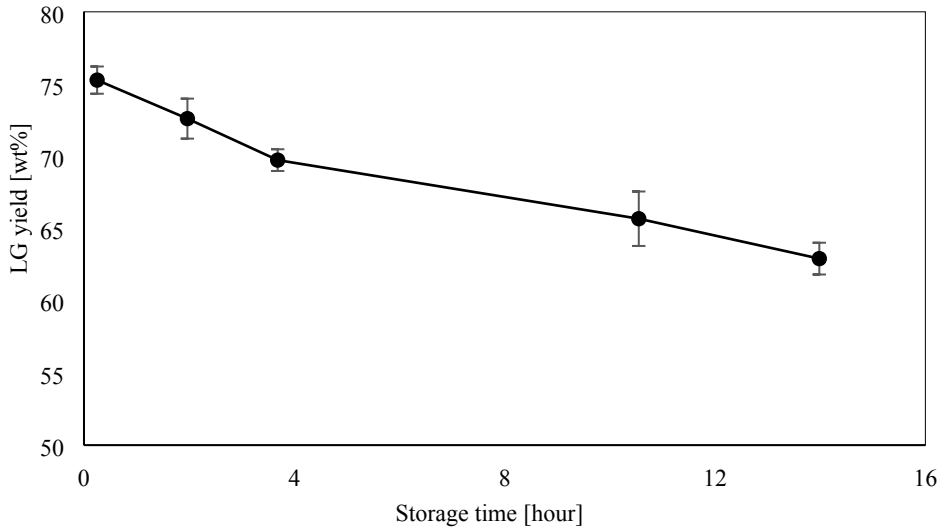


Fig S7. LG yield produced from pyrolysis of the air plasma-pretreated cellulose stored at ambient air for various times prior to pyrolysis. (Plasma pretreatment conditions: f = 15 kV, V = 2 kHz, t = 30 s.)

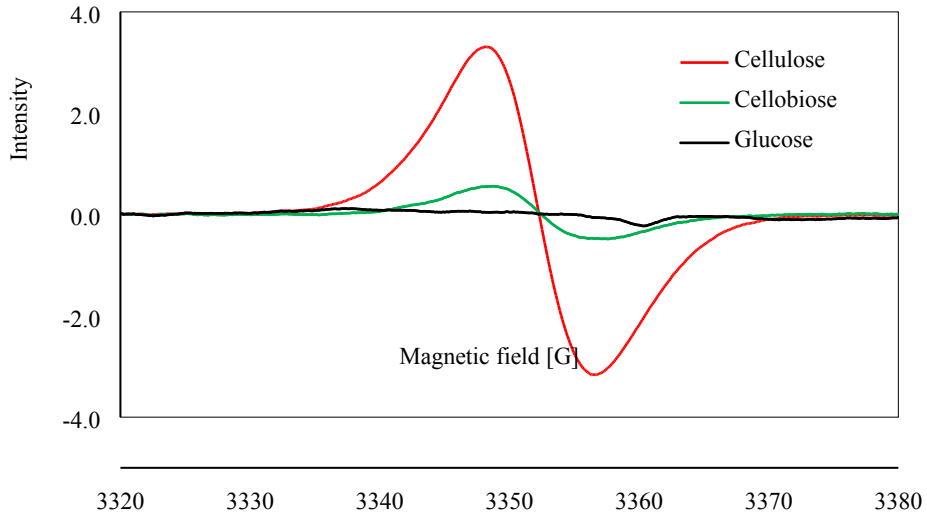


Fig S8. EPR spectra of the Ar plasma-pretreated cellulose and saccharides. (Plasma pretreatment conditions: f = 17.5 kV, V = 2 kHz, t = 30 s.)