Supplementary Material (ESI) for Green Chemistry

Supplemental Information

Ionic Liquid Solvent Properties as Predictors of Lignocellulose Pretreatment Efficacy

Thomas V. Doherty, Mauricio Mora-Pale, Sage E. Foley, Robert J. Linhardt, Jonathan S. Dordick*

*Corresponding author

Tel: (518) 276-2899

Fax: (518) 276-2207

E-mail: dordick@rpi.edu

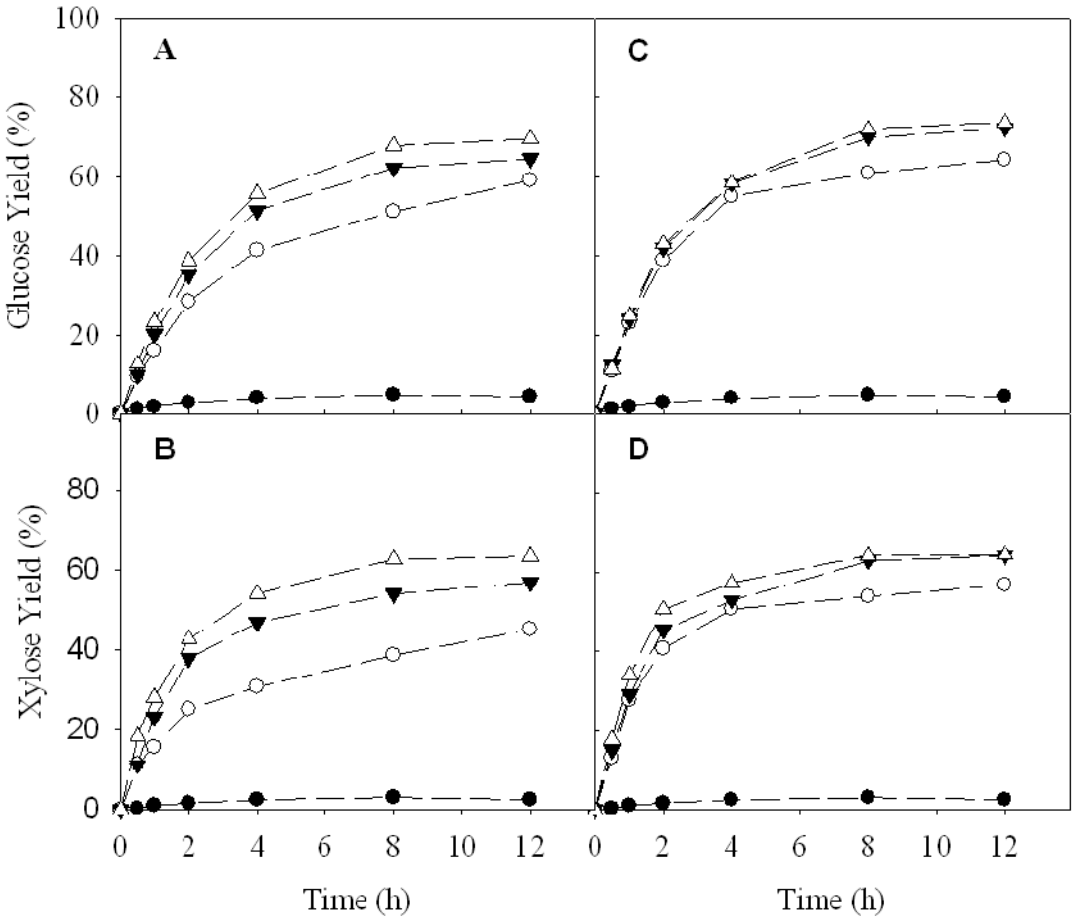

Figure S1. Enzymatic timecourse of glucose release from maple wood flour treated in [Emim] [OAc] (A) and [Bmim] [OAc] (C), and of xylose release from maple wood flour treated [Emim] [OAc] (B) and [Bmim] [OAc] (D). Pretreatment times were 6 h (o), 12 h (▼), and 24 h (Δ). Enzymatic timecourse of untreated maple wood flour is depicted by (●).

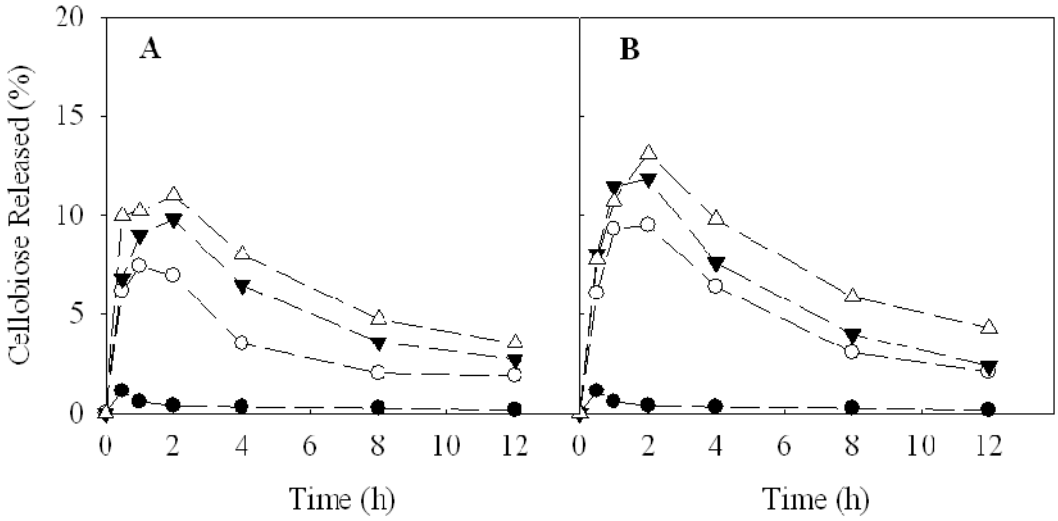

Figure S2. Enzymatic timecourse of cellobiose release from maple wood flour treated in [Emim] [OAc] (A) and [Bmim] [OAc] (B). Pretreatment times were 6 h (o), 12 h (▼), and 24 h (Δ). Enzymatic timecourse of untreated maple wood flour is depicted by (●).

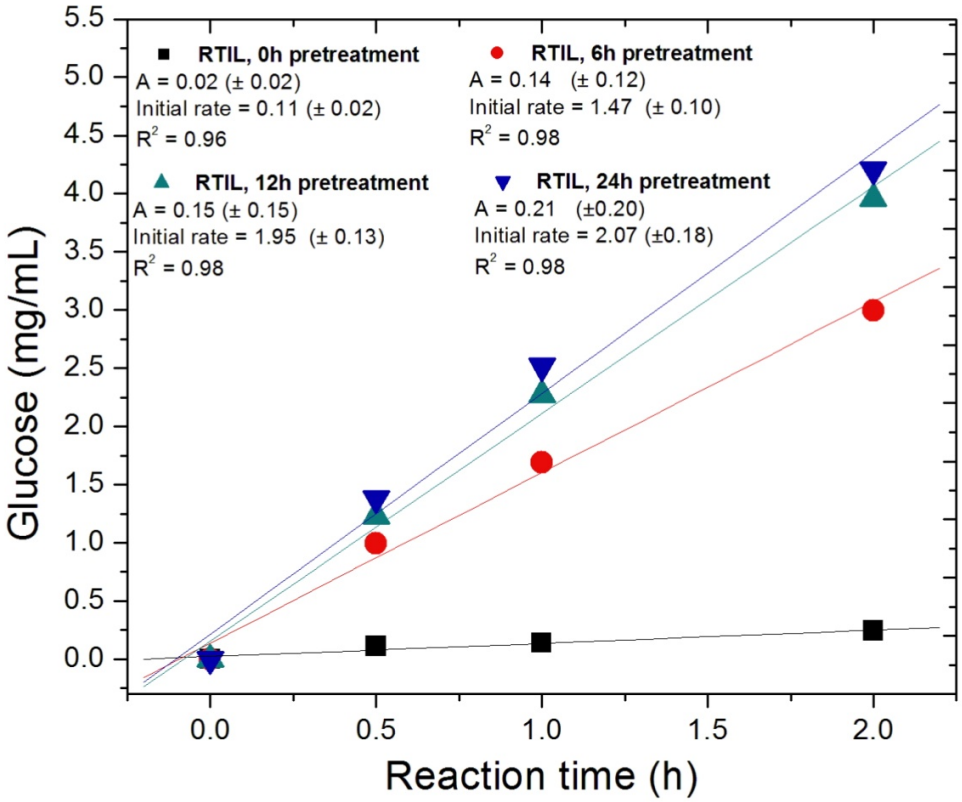

Figure S3. Initial rate calculation of enzymatic glucose release from maple wood flour pretreated in [Emim] [OAc].

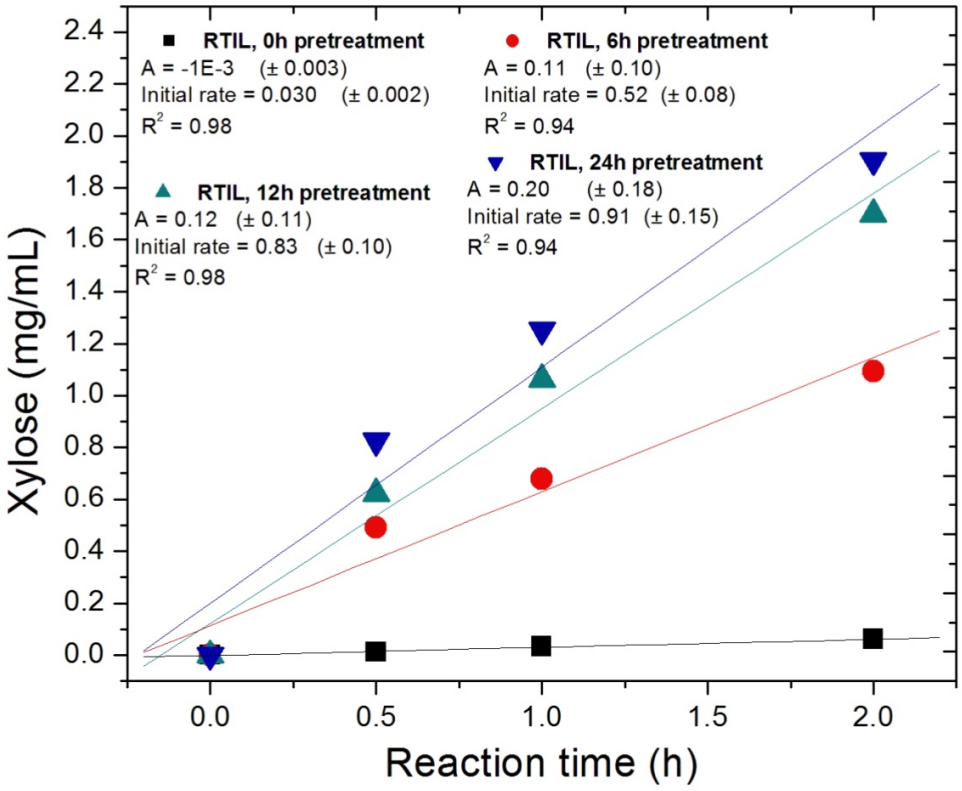

Figure S4. Initial rate calculation of enzymatic xylose release from maple wood flour pretreated in [Emim] [OAc].

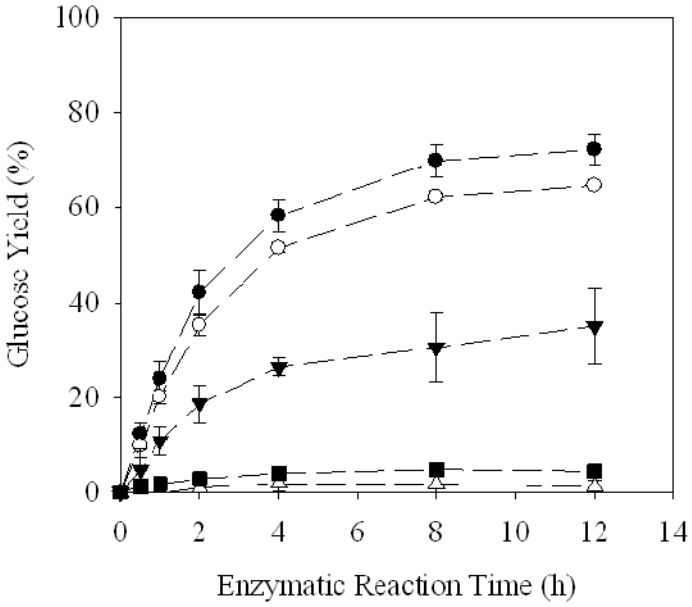

Figure S5. Enzymatic timecourse of glucose release from maple wood flour following 12 h pretreatment at 90°C in [Bmim] [OAc] (●), [Emim] [OAc] (○), [Bmim] [$MeSO_4$] (■), and of untreated MCC (▼), and untreated maple wood flour (Δ).

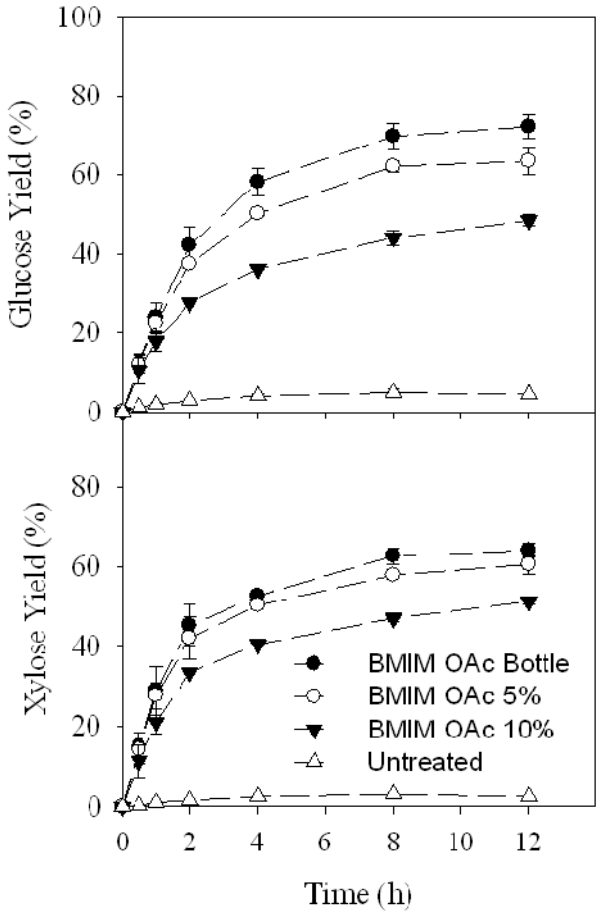

Figure S6. Enzymatic timecourse of glucose (Top) and xylose (Bottom) release from maple wood flour treated in [Bmim] [OAc]. RTIL was blended with 10% (w/w) H_2O (▼), 5% (w/w) H_2O (○), or 0% (w/w) H_2O (●). Enzymatic timecourse of untreated maple wood flour is depicted by (Δ).

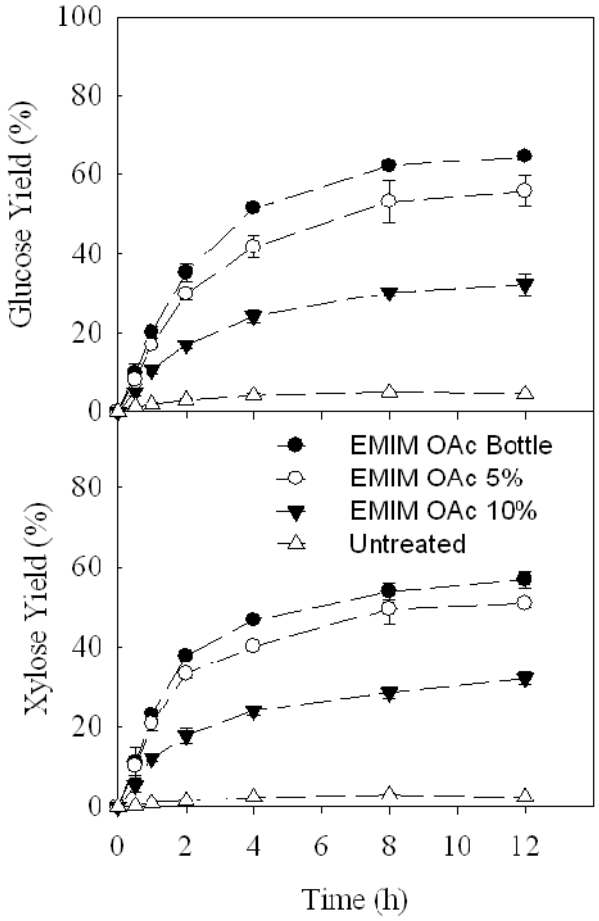

Figure S7. Enzymatic timecourse of glucose (Top) and xylose (Bottom) release from maple wood flour treated in [Emim] [OAc]. RTIL was blended with 10% (w/w) H_2O (▼), 5% (w/w) H_2O (○), or 0% (w/w) H_2O (●). Enzymatic timecourse of untreated maple wood flour is depicted by (Δ).

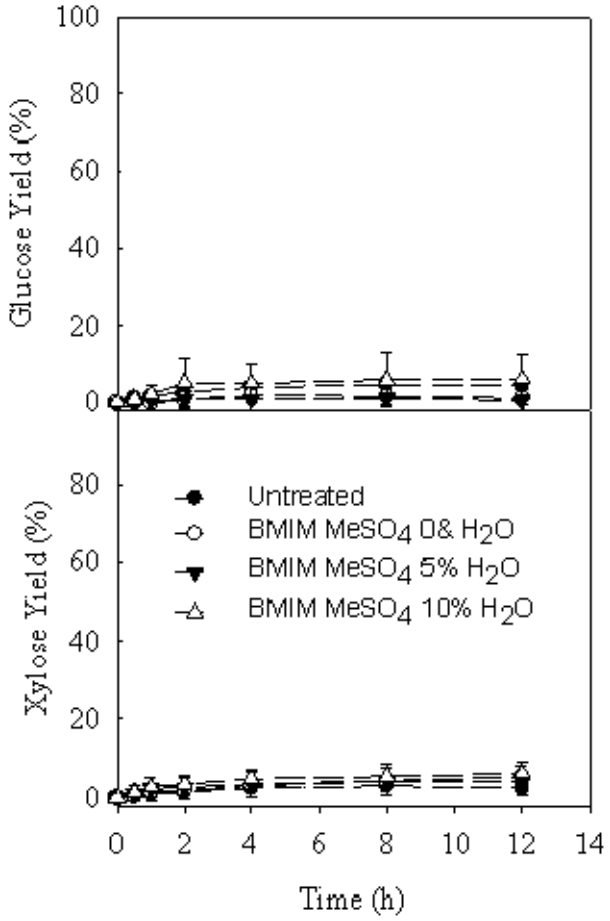

Figure S8. Enzymatic timecourse of glucose (Top) and xylose (Bottom) release from maple wood flour treated in [Bmim] [$MeSO_4$]. RTIL was blended with 10% (w/w) H_2O (Δ), 5% (w/w) H_2O (▼), or 0% (w/w) H_2O (o). Enzymatic timecourse of untreated maple wood flour is depicted by (●).

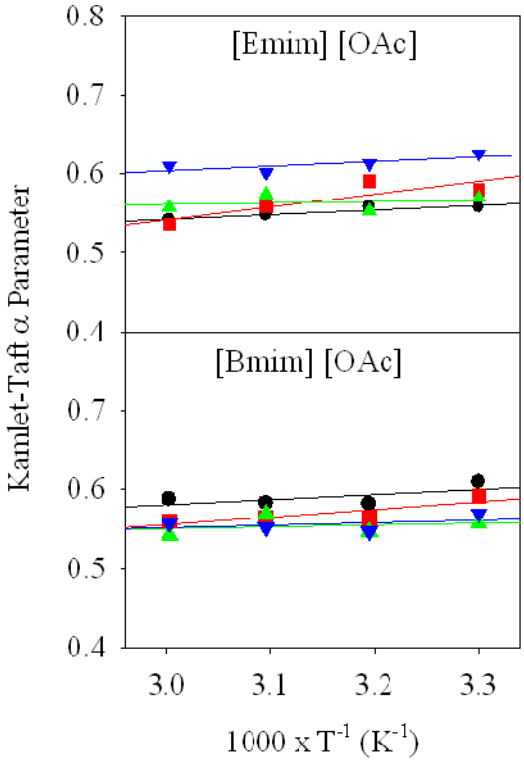

Figure S9. Temperature dependence of Kamlet-Taft α parameter for [Emim] [OAc], and [Bmim] [OAc] with 0% (●), 5% (■), 10% (▲), and 20% (w/w) (▼) added water.

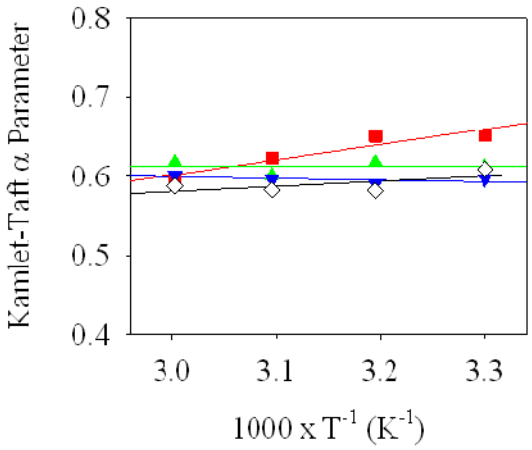

Figure S10. Temperature dependence of the Kamlet-Taft α parameter for a [Bmim] [OAc] / [Bmim] [$MeSO_4$] binary solution; wt% [Bmim] [OAc] – 25% (■), 50% (▲), 75% (▼), 100% (w/w) (◊).

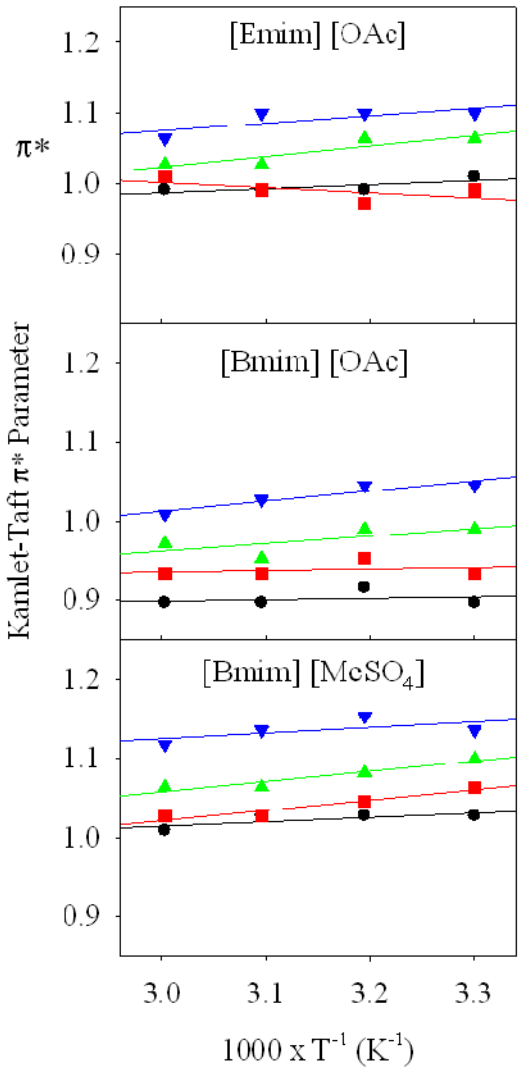

Figure S11. Temperature dependence of the Kamlet-Taft π* parameter for [Emim] [OAc], [Bmim] [OAc], and [Bmim] [$MeSO_4$] with 0% (●), 5% (■), 10% (▲), and 20% (w/w) (▼) added water.

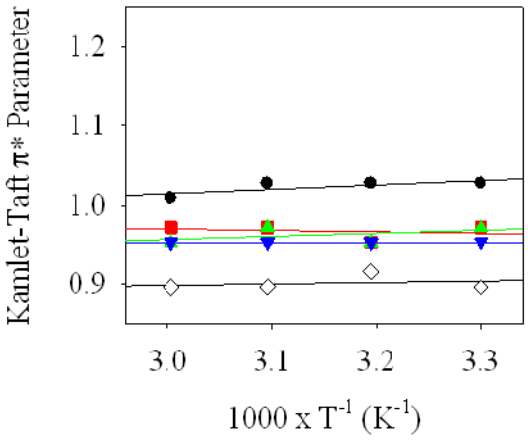

Figure S12. Temperature dependence of the Kamlet-Taft π* parameter for a [Bmim] [OAc] / [Bmim] [$MeSO_4$] binary solution; wt% [Bmim] [OAc] – 0% (●), 25% (■), 50% (▲), 75% (▼), 100% (w/w) (◊).

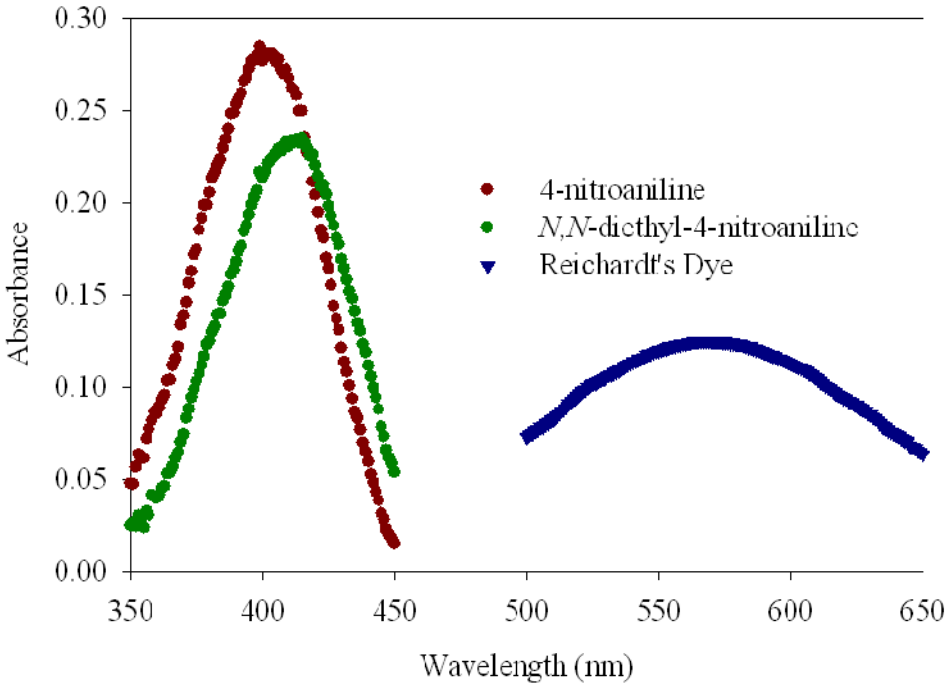

Figure S13. UV Spectra of 50% (w/w) [Bmim] [OAc] / [Bmim] [$MeSO_4$] binary solution containing either 4-nitroaniline, *N,N*-diethyl-4-nitroaniline, or Reichardt's Dye.

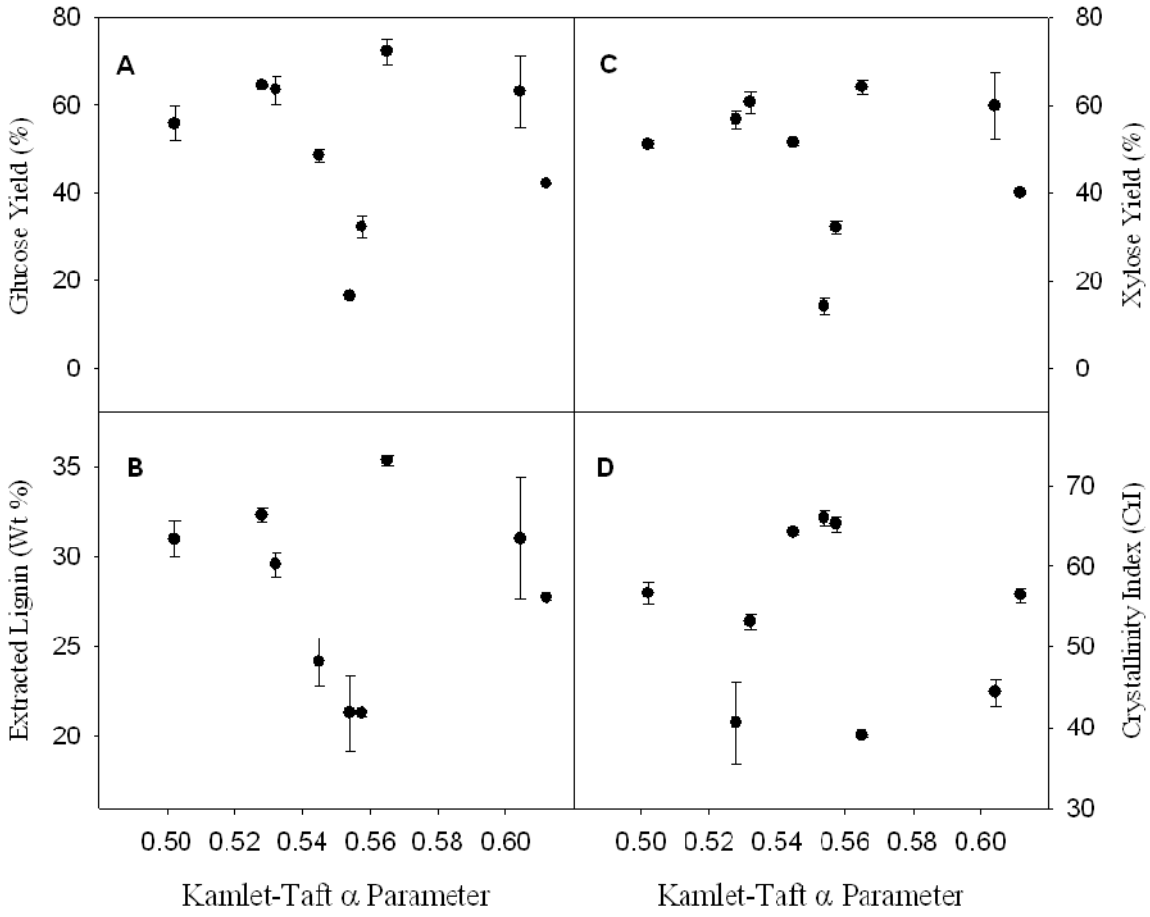

Figure S14. Correlation of α parameter extrapolated to 90°C with glucose yield (A), extracted lignin (B), xylose yield (C) and CrI (D) for the series of RTILs studied.

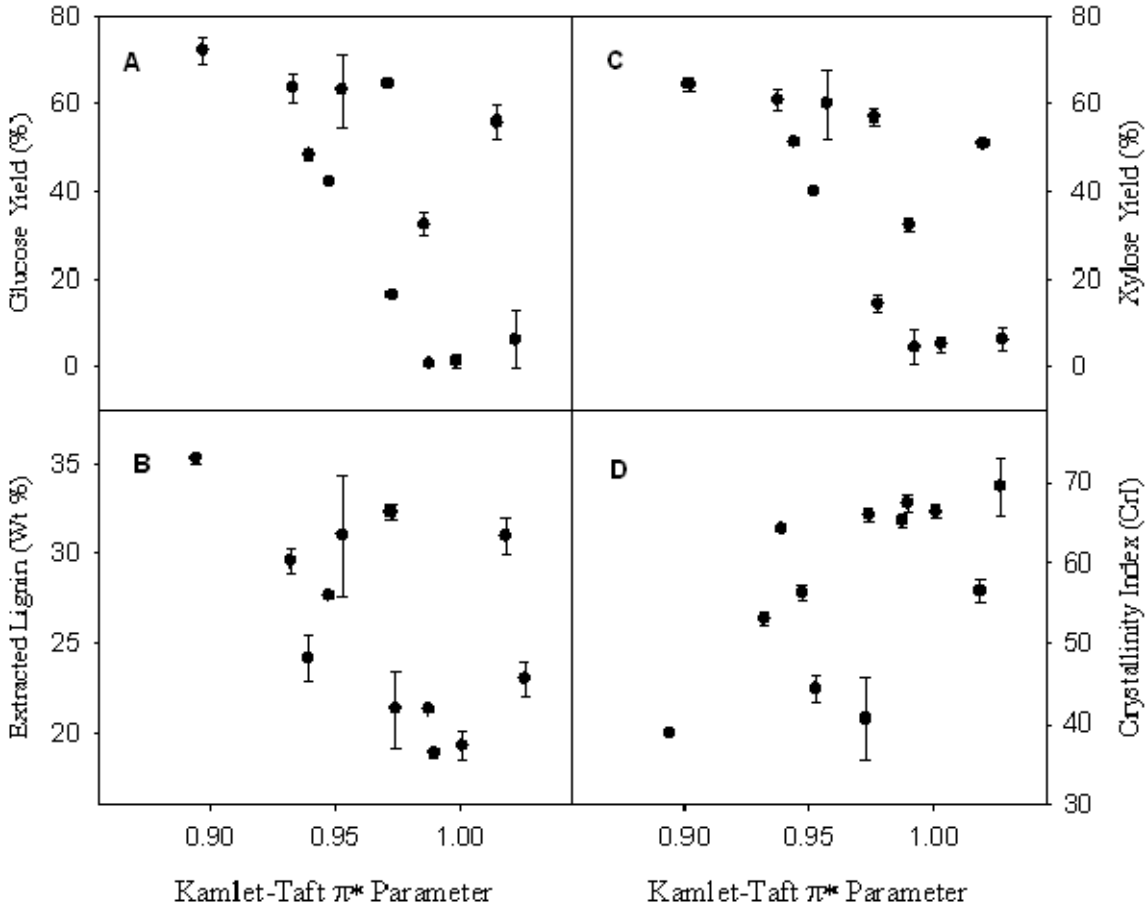

Figure S15. Correlation of π* parameter extrapolated to 90°C with glucose yield (A), extracted lignin (B), xylose yield (C) and CrI (D) for the series of RTILs studied.