Supporting information

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1. Synthesis

1,5-Diazabicyclo[4.3.0]non-5-enium acetate [DBNH][OAc]

65.38 g (0.526 mol) of freshly distilled DBN was weighed into the reactor. The airspace was then replaced with argon gas followed by slow addition of 31.61 g (0.526 mol) of acetic acid. The temperature of the mildly exothermic reaction was kept below 70°C during the addition and after the last of the acetic acid the reactor was sealed and let to mix for 30 minutes in 100°C. The composition of the formed IL was characterized by NMR in $d_6$-DMSO and $d_4$-MeOH.

$^1$H NMR (in ppm, $d_4$-MeOH, 600 MHz, 27°C): $\delta$ 3.70 (t, $J = 7.3$ Hz, 2H), 3.46 (s, $J = 5.9$ Hz, 2H), 3.41 (t, $J = 5.8$ Hz, 2H), 2.89 (t, $J = 8.0$ Hz, 2H), 2.17 (dt, $J = 8.0$, 7.3, 2H), 2.05 (dt, $J = 5.9$, 5.8 Hz, 2H), 1.89 (s, 3H).

$^{13}$C NMR (in ppm, $d_4$-MeOH, 151 MHz, 27°C): $\delta$ 180.04, 165.88, 54.63, 43.52, 39.29, 31.13, 30.11, 24.39, 19.75

$^1$H NMR (in ppm, $d_6$-DMSO, 600 MHz, 27°C): $\delta$ 3.49 (t, $J = 7.1$ Hz, 2H), 3.39 (t, $J = 6.7$ Hz, 2H), 2.90 (t, $J = 7.3$ Hz, 2H), 2.40 (t, $J = 8.1$ Hz, 2H), 2.08 (dt, $J = 8.1$, 7.1 Hz, 2H), 1.90 (dt, $J = 7.3$, 6.7 Hz, 2H), 1.89 (s, 3H).

$^{13}$C NMR (in ppm, $d_6$-DMSO, 151 MHz, 27°C): $\delta$ 180.1, 178.40, 48.70, 40.50, 38.10, 21.80, 26.5, 24.20, 18.90

1-(3-Ammoniopropyl)-2-pyrrolidone acetate [APPH][OAc]

DBN was hydrolysed by refluxing in equal volume of distilled water for 18 hours. Water was removed from the mixture by rotary evaporation and the residue was distilled under oil pump vacuum to give 1-(3-aminopropyl)-2-pyrrolidone (APP) in excellent yield. Exactly one equivalent of acetic acid was added with cooling and stirring to the APP to give an oil which slowly solidified to give the title compound as a white crystalline mass. The product was characterized by NMR in $d_6$-DMSO and $d_4$-MeOH.

$^1$H NMR (in ppm, $d_4$-MeOH, 600 MHz, 27°C): $\delta$ 3.49 (t, $J = 7.1$ Hz, 2H), 3.39 (t, $J = 6.7$ Hz, 2H), 2.90 (t, $J = 7.3$ Hz, 2H), 2.40 (t, $J = 8.1$ Hz, 2H), 2.08 (dt, $J = 8.1$, 7.1 Hz, 2H), 1.90 (dt, $J = 7.3$, 6.7 Hz, 2H), 1.89 (s, 3H).

$^{13}$C NMR (in ppm, $d_4$-MeOH, 151 MHz, 27°C): $\delta$ 180.1, 178.40, 48.70, 40.50, 38.10, 21.80, 26.5, 24.20, 18.90

$^1$H NMR (in ppm, $d_6$-DMSO, 600 MHz, 27°C): $\delta$ 5.41 (br, 3H), 3.31 (t, $J = 7.0$ Hz, 2H), 3.20 (t, $J = 7.0$ Hz, 2H), 2.53 (t, $J = 7.0$ Hz, 2H), 2.21 (t, $J = 8.1$, 2H), 1.91 (dt, $J = 8.1$, 7.0, 2H), 1.79 (s, 3H), 1.57 (p, $J = 7.0$ Hz, 2H).

$^{13}$C NMR (in ppm, $d_6$-DMSO, 151 MHz, 27°C): $\delta$ 174.08, 46.29, 39.12, 37.08, 30.39, 26.95, 23.80, 17.50
2. Spectra

a. S1. UV-VIS reflectance spectra
UV-Vis-reflectance (left) and difference reflectance (right) spectra of the untreated and in [DBNH][OAc] treated pulp samples. In difference reflectance spectra, the formed chromophores compared to the untreated pulp can be seen as positive signals and reacted/removed structures as negative signals.

b. S2. K/s spectra
K/s absorbance (left) and difference absorbance spectra (right) of the untreated and in [DBNH]AcO treated samples.
c. S3. [APPH][OAc] $^1$H NMR in $d_4$-MeOH

d. S4. [APPH][OAc] $^{13}$C NMR in $d_4$-MeOH
e. S5. [APPH][OAc] COSY in $d_7$-MeOH
f. S6. [APPH][OAc] HMBC in $d_7$-MeOH

![Image of HMBC spectrum]

g. S7. [APPH][OAc] HSQC in $d_7$-MeOH

![Image of HSQC spectrum]
h. S8. [APPH][OAc] TOCSY in $d_6$-MeOH
i. \([DBNH][OAc] \text{}^1\text{H NMR in } d_2\text{-MeOH}\)

\[\text{S9. [DBNH][OAc]} \text{}^1\text{H NMR in } d_2\text{-MeOH}\]

j. \([DBNH][OAc] \text{}^{13}\text{C NMR in } d_2\text{-MeOH}\)

\[\text{S10. [DBNH][OAc]} \text{}^{13}\text{C NMR in } d_2\text{-MeOH}\]
k. [APPH][OAc] $^1$H NMR in $d_6$-DMSO

l. [APPH][OAc] $^{13}$C NMR in $d_6$-DMSO
m. S13. [APPH][OAc] HMBC in $d_6$-DMSO

n. S14. [APPH][OAc] HSQC in $d_6$-DMSO
o. S15. [DBNH][OAc] $^1$H NMR in $d_6$-DMSO

p. S16. [DBNH][OAc] $^{13}$C NMR in $d_6$-DMSO

$^{13}$C NMR (100 MHz; DMSO-d$_6$): δ 173.83, 162.87, 152.16, 49.94, 38.12, 29.43, 28.75, 18.72, 18.57.
q. S17. [DBNH][OAc] HMBC in $d_6$-DMSO

r. S18. [DBNH][OAc] HSQC in $d_6$-DMSO