

## Supplementary information for

### **Tailoring suitable partner system for cholinium cation to build effective solvents on biomass deconstruction**

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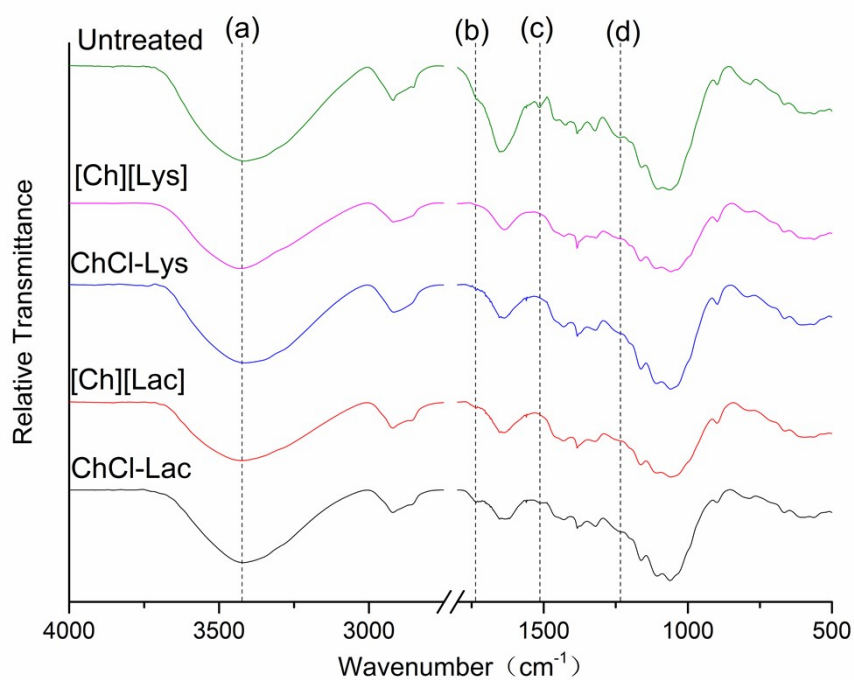


Fig.S1 FTIR spectra of untreated rice straw and rice straw treated with DES or IL (a) 3,400  $\text{cm}^{-1}$ ; (b) 1,732  $\text{cm}^{-1}$ ; (c) 1,512  $\text{cm}^{-1}$ ; and (d) 1,249  $\text{cm}^{-1}$

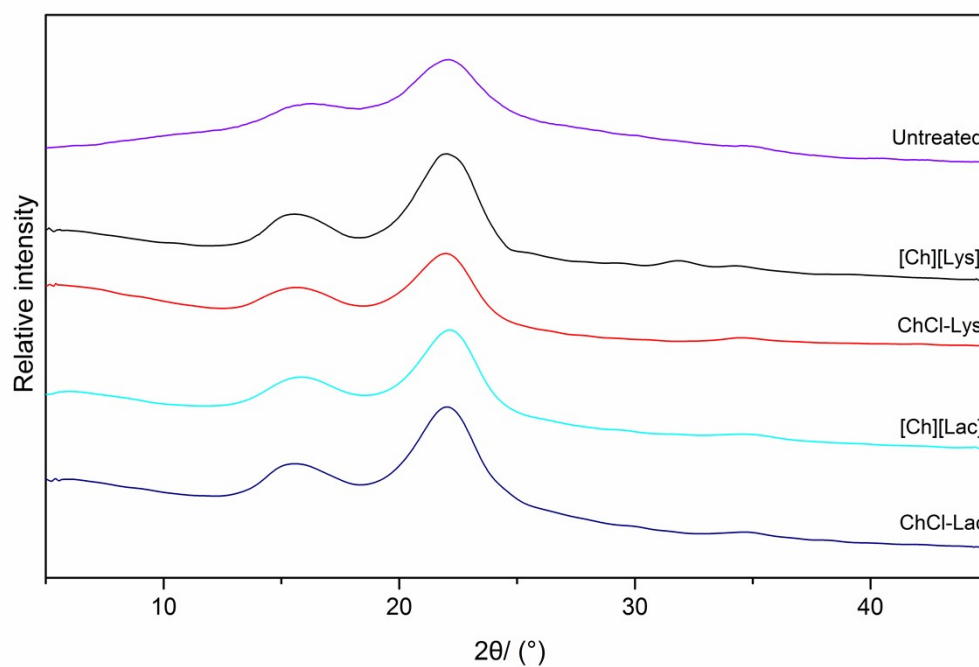


Fig.S2 X-ray diffraction spectra of untreated and pretreated rice straw

Table S1 The enzymatic hydrolysis of the untreated rice straw and residues

| Entry | Solvent   | Total phenolic contents(mg<br>GAE/g) <sup>c</sup> |
|-------|-----------|---------------------------------------------------|
| 1     | Untreated | 2.435±0.040                                       |
| 2     | ChCl-Lac  | 0.311±0.060                                       |
| 4     | ChCl-Lys  | 0.424±0.035                                       |
| 6     | [Ch][Lac] | 0.393±0.012                                       |
| 8     | [Ch][Lys] | 0.071±0.005                                       |

Table S2 Topological parameters at bond critical points (BCPs) for GG-solvent complexes

| Systems      | Hydrogen bonds | Sort                  | $\rho_{\text{BCP}}$<br>(a.u) | $V_{\text{BCP}}$<br>(a.u) | $\nabla^2\rho_{(\text{BCP})}$ (a.u) | H (r)      |
|--------------|----------------|-----------------------|------------------------------|---------------------------|-------------------------------------|------------|
| ChCl-Lac-GG  | O19-H20...C144 | GG-[Cl] <sup>-</sup>  | 0.0237                       | -0.0157                   | 0.0603                              | -0.0003125 |
|              | O17-H18...O76  | GG-Lac                | 0.0199                       | -0.0152                   | 0.0687                              | 0.0009875  |
|              | C23-H26...O76  | GG-Lac                | 0.0061                       | -0.0092                   | 0.0370                              | 0.0000250  |
|              | O70-H71...O17  | Lac-GG                | 0.0126                       | -0.0098                   | 0.0434                              | 0.0005250  |
|              | C48-H49...O19  | [Ch] <sup>+</sup> -GG | 0.0101                       | -0.0076                   | 0.0322                              | 0.0002250  |
|              | C55-H56...O19  | [Ch] <sup>+</sup> -GG | 0.0149                       | -0.0112                   | 0.0419                              | -0.0003625 |
|              | C59-H60...O19  | [Ch] <sup>+</sup> -GG | 0.0100                       | -0.0073                   | 0.0320                              | 0.0003500  |
|              | C59-H60...O17  | [Ch] <sup>+</sup> -GG | 0.0085                       | -0.0060                   | 0.0266                              | 0.0003250  |
| ChCl-Lys-GG  | O19-H20...C144 | GG-[Cl] <sup>-</sup>  | 0.0203                       | -0.0127                   | 0.0507                              | -0.0000125 |
|              | N83-H85...O19  | Lys-GG                | 0.0110                       | -0.0086                   | 0.0373                              | 0.0003625  |
|              | C48-H50...O21  | [Ch] <sup>+</sup> -GG | 0.0086                       | -0.0060                   | 0.0335                              | 0.0011875  |
|              | C59-H60...O21  | [Ch] <sup>+</sup> -GG | 0.0068                       | -0.0049                   | 0.0289                              | 0.0011625  |
|              | C59-H62...O37  | [Ch] <sup>+</sup> -GG | 0.0043                       | -0.0028                   | 0.0167                              | 0.0006875  |
|              | C14-H16...O64  | GG-[Ch] <sup>+</sup>  | 0.0108                       | -0.0077                   | 0.0333                              | 0.0003125  |
| [Ch][Lac]-GG | O19-H20...O54  | GG-[Lac] <sup>-</sup> | 0.0441                       | -0.0379                   | 0.1532                              | 0.0002000  |
|              | O17-H18...O51  | GG-[Lac] <sup>-</sup> | 0.0273                       | -0.0205                   | 0.1083                              | 0.0032875  |
|              | C23-H26...O51  | GG-[Lac] <sup>-</sup> | 0.0060                       | -0.0038                   | 0.0205                              | 0.0006625  |
|              | C14-H15...O51  | GG-[Lac] <sup>-</sup> | 0.0100                       | -0.0069                   | 0.0313                              | 0.0004625  |
|              | C65-H68...O37  | [Ch] <sup>+</sup> -GG | 0.0076                       | -0.0055                   | 0.0293                              | 0.0009125  |
|              | C69-H71...O37  | [Ch] <sup>+</sup> -GG | 0.0041                       | -0.0024                   | 0.0179                              | 0.0010375  |
|              | C65-H66...O21  | [Ch] <sup>+</sup> -GG | 0.0173                       | -0.0135                   | 0.0528                              | -0.0001500 |
|              | C58-H59...O19  | [Ch] <sup>+</sup> -GG | 0.0115                       | -0.0089                   | 0.0416                              | 0.0007500  |
| [Ch][Lys]-GG | C69-H70...O19  | [Ch] <sup>+</sup> -GG | 0.0120                       | -0.0086                   | 0.0335                              | -0.0001125 |
|              | O17-H18...O87  | GG-[Lys] <sup>-</sup> | 0.0456                       | -0.0401                   | 0.1567                              | -0.0004625 |
|              | O19-H20...O86  | GG-[Lys] <sup>-</sup> | 0.0312                       | -0.0240                   | 0.1130                              | 0.0021250  |
|              | C23-H26...O86  | GG-[Lys] <sup>-</sup> | 0.0092                       | -0.0063                   | 0.0303                              | 0.0006375  |
|              | C2-H7...O87    | GG-[Lys] <sup>-</sup> | 0.0166                       | -0.0127                   | 0.0538                              | 0.0003750  |
|              | C47-H48...O19  | [Ch] <sup>+</sup> -GG | 0.0106                       | -0.0077                   | 0.0324                              | 0.0002000  |
|              | C54-H55...O19  | [Ch] <sup>+</sup> -GG | 0.0079                       | -0.0056                   | 0.0301                              | 0.0009625  |
|              | C58-H59...O19  | [Ch] <sup>+</sup> -GG | 0.0102                       | -0.0076                   | 0.0308                              | 0.0000500  |
|              | C54-H55...O21  | [Ch] <sup>+</sup> -GG | 0.0147                       | -0.0113                   | 0.0433                              | -0.0002375 |