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**Brønsted acidic ionic liquids for cellulose hydrolysis in aqueous medium: Structural effects on acidity and glucose yield**

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The file includes: Supporting Fig. S1–S3 and Table S1–S2
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- Instrument: TG-DTA 7200 (Hitachi High-Technologies, Co. Ltd.)
- Apparatus: open-type aluminum pan
- Sample loading: 10 mg
- Heating rate: 10 °C min⁻¹
- N₂ flow: 200 mL min⁻¹

Fig. S1 TG curves of zwitterions.

Table S1 Thermal property of zwitterions

| Zwitterion | \( T_{d-5\%} \) / °C |
|-----------|-----------------|
| Mimps     | 326             |
| Mims      | 302             |
| Imds      | 226             |

* Prior to TG measurement, each zwitterion was dried at 120°C for 1 h under N₂.
* \( T_{d-5\%} \): 5% weight loss temperature.

Fig. S2 Optimized molecular structures of BAILs with mono— or disulfuric acid groups using B3LYP/6-311G++(d, p).
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**Table S2** Residual amount of residue after cellulose hydrolysis (160 °C, 15 min) in 1 M BAILs aqueous solution

| Zw/a | HX  | Glucose yield / % | Residue c / wt.% |
|------|-----|-------------------|-----------------|
| Mim ps | H₂S O₄ | 32.3±2.2 | 5.6 |
| Bimp s  | 30.7±2.2 | 19 |
| Oimp s  | 36.3±3.8 | 21 |
| Mim ps | HCl | 23.7±0.3 | 24 |
| Bimp s  | 26.0±1.5 | 30 |
| Oimp s  | 27.7±1.2 | 26 |

a Zw: zwitterion. b HX: kinds of acid used to prepare BAILs called as Zw/HX; X is corresponded to anion species. c Represented as wt.% to the starting weight of cellulose (10 mg).
Fig. S3 (1) Optimized molecular structures of BAILs with HSO₄ anion using B3LYP/6-311G++(d, p).
**Fig. S3 (2)** Optimized molecular structures of BAILs with Cl anion using B3LYP/6-311G++(d, p).
Fig. S3 (3) Optimized molecular structures of BAILs with sulfonic acid anion or carboxylic acid anion using B3LYP/6-311G++(d, p).
Fig. S3 (4) Optimized molecular structures of BAII with TFSI anon or phosphoric acid anion using B3LYP/6-311G++(d, p).