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Supplementary Information

Improving SO_2 Capture by Tuning Functional Groups on the Cation of Pyridinium-based Ionic Liquids

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1. NMR data of the pyridinium-based ILs

[NEt_2C_2Py][SCN]: ^{1}H NMR(d_6-DMSO) : 0.73 (t, 3H), 2.44 (m, 2H), 2.86 (m, 2H), 4.65 (t, 2H), 8.15 (t, 2H), 8.61 (t, 1H), 9.00 (d, 2H); ^{13}C NMR(d_6-DMSO) : 145.86, 145.60, 130.31, 127.76, 59.52, 53.01, 46.70, 12.12.

After the absorption of SO_2: ^{1}H NMR(d_6-DMSO) : 0.83(t, 3H), 2.58(m, 2H), 2.99(m, 2H), 4.70(t, 2H), 8.17(t, 2H), 8.61(t, 1H), 9.01(d, 2H); ^{13}C NMR(d_6-DMSO) :146.02, 145.69, 129.27, 127.92, 58.72, 52.53, 46.67, 11.56.

[C_4OPy][SCN]: ^{1}H NMR($CDCl_3$) : 1.12 (t, 3H), 3.52 (m, 2H), 4.00 (m, 2H), 5.04 (t, 2H), 8.20 (t, 2H), 8.67 (t, 1H), 9.16 (d, 2H); ^{13}C NMR($CDCl_3$) : 145.92, 145.28, 131.67, 128.27, 77.39, 68.26, 66.88, 14.92.

After the absorption of SO_2: ^{1}H NMR($CDCl_3$) : 1.12 (t, 3H), 3.51 (m, 2H), 3.98 (m, 2H), 4.96 (t, 2H), 8.17 (t, 2H), 8.63 (t, 1H), 9.04 (d, 2H); ^{13}C NMR($CDCl_3$) :145.92, 145.16, 129.26, 128.30, 77.34, 68.19, 66.86, 14.88.

[C_4CNPy][SCN]: ^{1}H NMR(d_6-DMSO) : 1.66 (t, 3H), 2.09 (m, 2H), 2.63 (m, 2H), 4.73 (t, 2H), 8.23 (t, 2H), 8.67 (t, 1H), 9.16 (d, 2H); ^{13}C NMR(d_6-DMSO) : 145.55, 144.69, 129.76, 128.17, 120.28, 59.96, 29.76, 21.54, 15.83.

After the absorption of SO_2: ^{1}H NMR(d_6-DMSO) : 1.65 (t, 3H), 2.08 (m, 2H), 2.58 (m, 2H), 4.71 (t, 2H), 8.21 (t, 2H), 8.66 (t, 1H), 9.13 (d, 2H); ^{13}C NMR(d_6-DMSO) : 145.55, 144.68, 129.67, 128.17, 120.28, 59.84, 29.75, 21.52, 15.81.

2. Densities and viscosities of the ILs at different temperatures

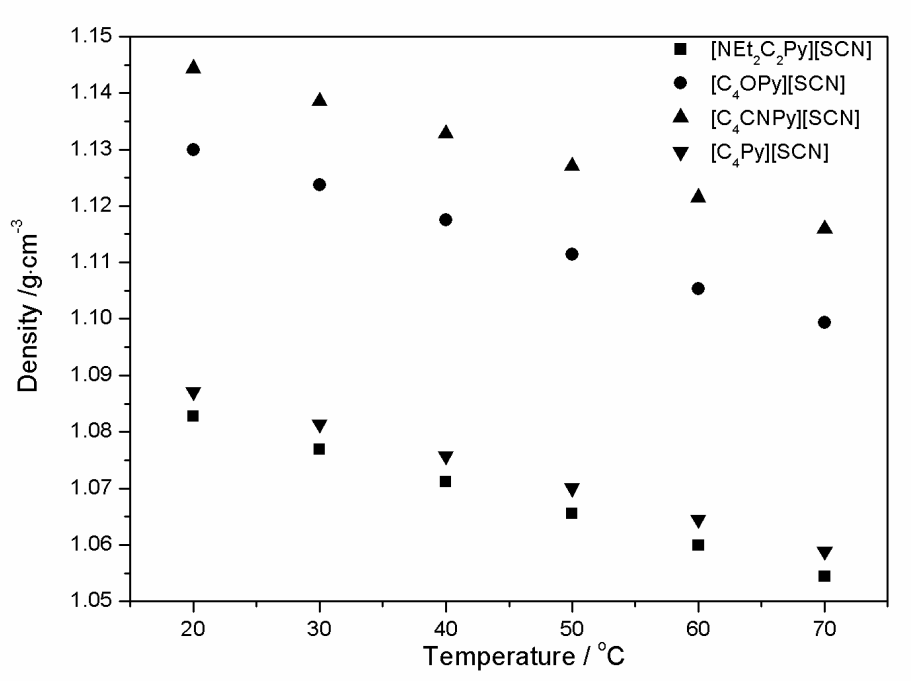


Fig.S1 Variation in the densities of pyridinium-based ILs with temperature

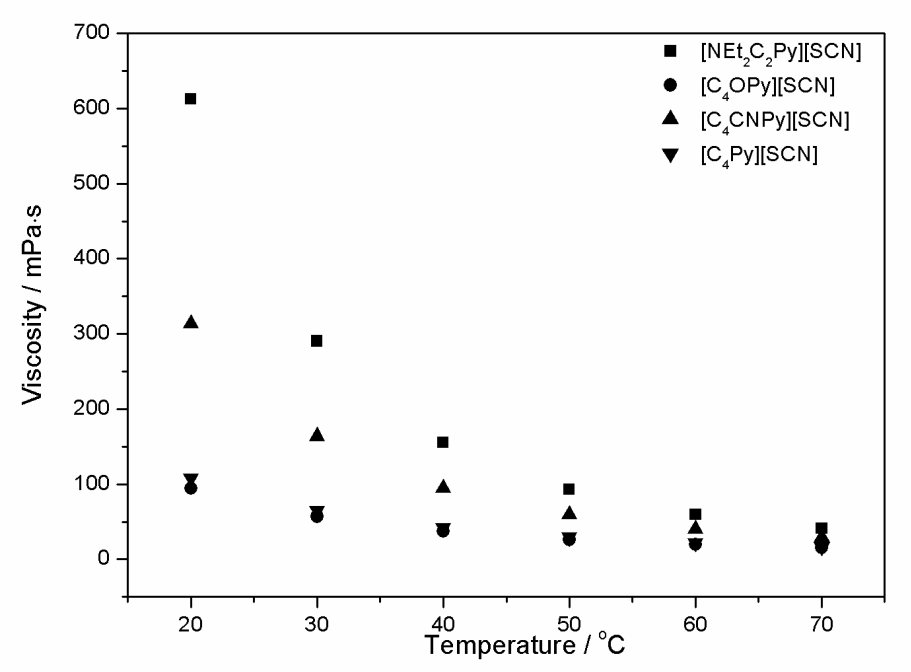


Fig.S2 Variation in the viscosities of pyridinium-based ILs with temperature

3. TGA results for the pyridinium-based ILs

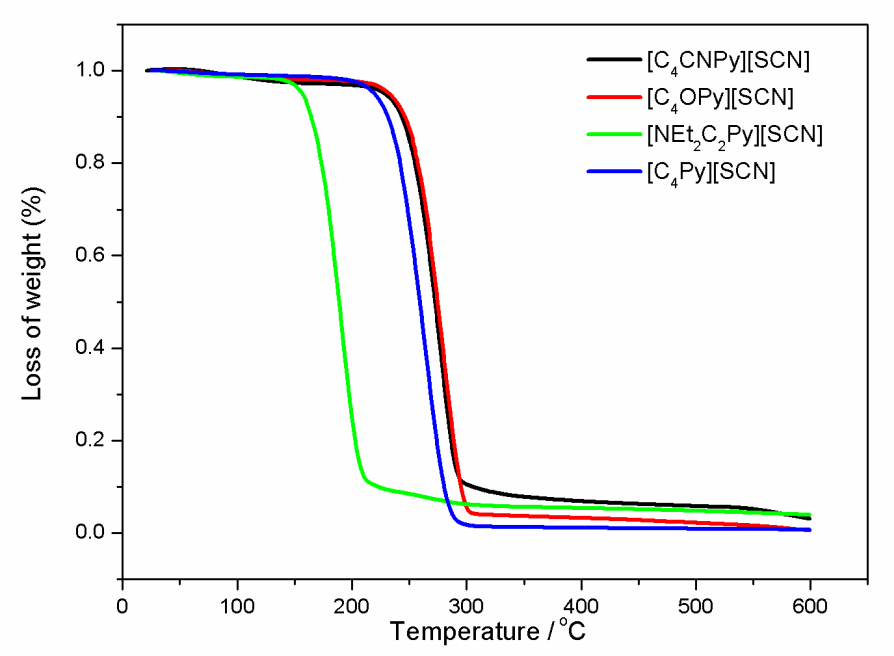


Fig.S3 TGA results for the pyridinium-based ILs with a 10℃ min^{-1} temperature heating rate to 600℃ under N_2 atmosphere

4. Effect of water on SO_2 absorption for[C_4OPy][SCN]

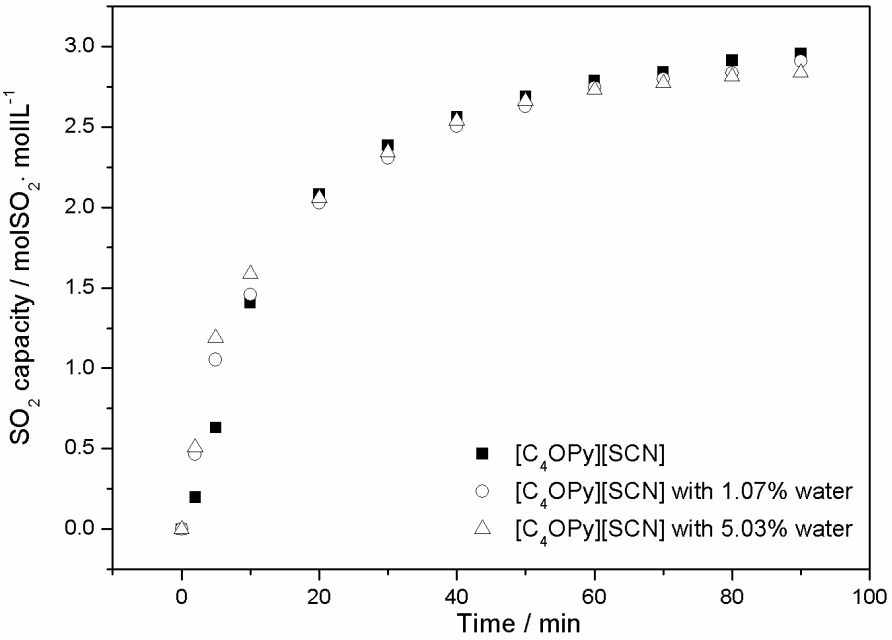


Fig.S4 Effect of water on the SO_2 absorption capacity by $[C_4OPy][SCN]$ at 20℃ and 0.1 MPa

5. FTIR and NMR spectra of the pyridinium-based ILs

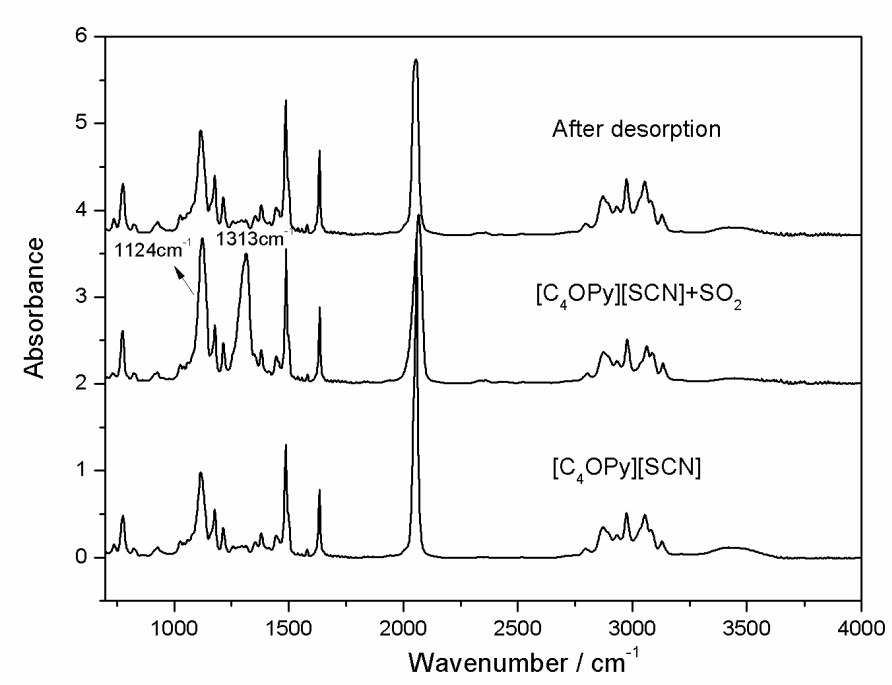


Fig.S5 FT-IR spectra of $[C_4OPy][SCN]$ before and after SO_2 absorption and after SO_2 desorption

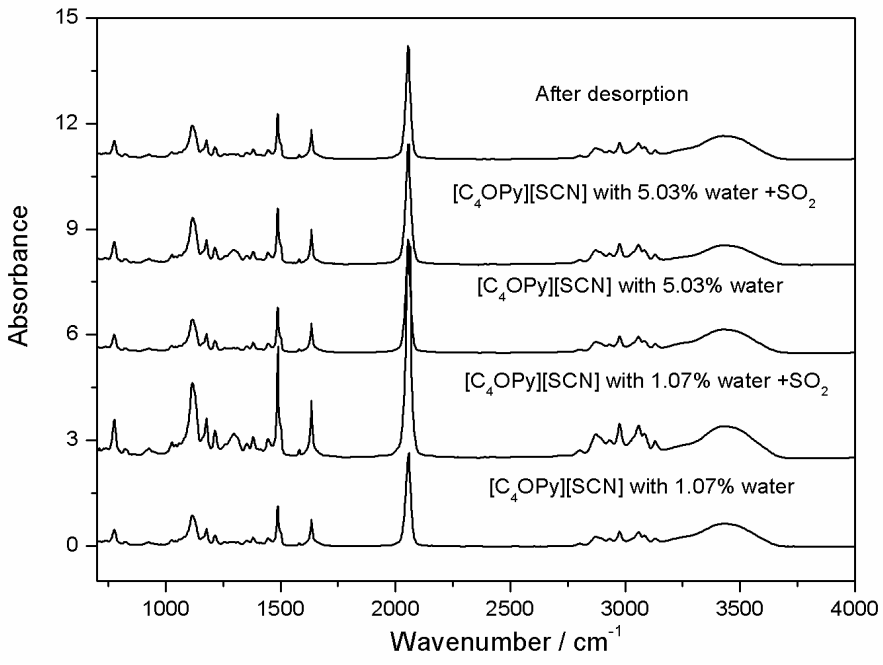
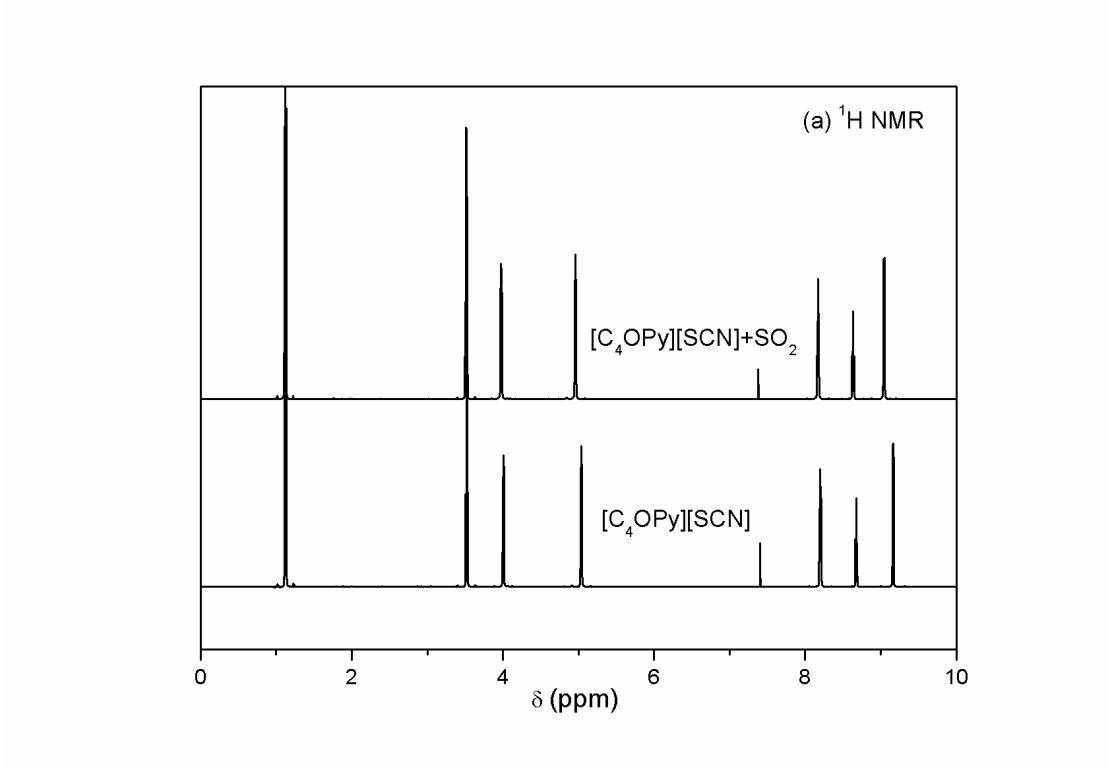


Fig.S6 FT-IR spectra of $[C_4OPy][SCN]$ with water before and after absorption of SO_2 and after desorption



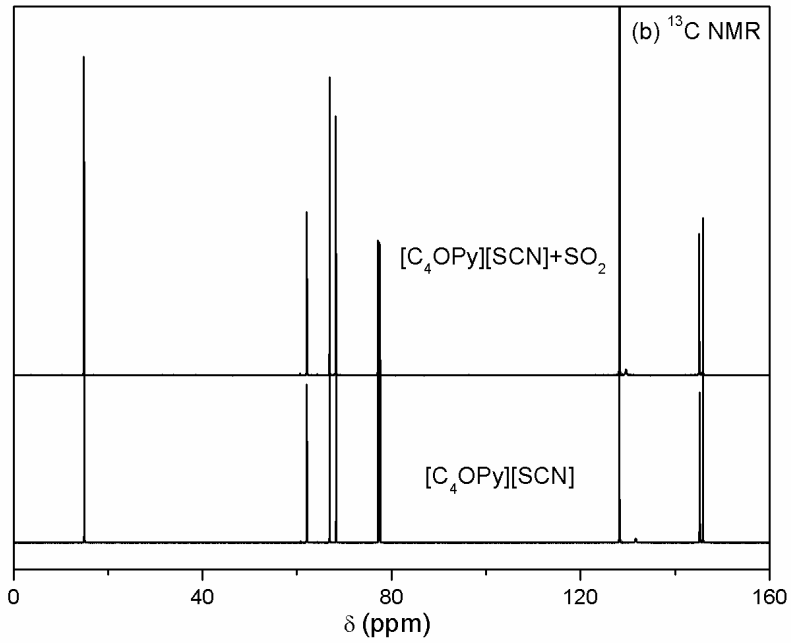


Fig.S7 ^{1}H NMR (a) and ^{13}C NMR (b) spectra of [C_4OPy][SCN] before and after SO_2 absorption