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Electronic Supplementary Information

Micellization, Surface Activities and Thermodynamics study of pyridinium-based ionic liquids surfactants in aqueous solution

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Characterizations of [C*n*mpy][Br]

n-dodecyl-3-methylpyridinium bromide ([C_{12}mpy][Br])

The title compound was buff crystals. Yield: 94%. ^{1}H NMR ($CDCl_3$, 400 MHz), δ: 9.490 (s, 1H), 9.304 (d, 1H), 8.266 (d, 1H), 8.034 (t, 1H), 4.929 (t, 2H), 2.633 (s, 3H), 2.035 (t, 2H), 1.487~1.103 (m, 18H), 0.842(t, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz), δ: 145.58, 144.67, 142.31, 139.61, 61.79, 31.88, 29.57, 29.31, 26.10, 22.66, 18.72, 14.11. FTIR (KBr), ν/cm^{-1}: 2996, 2919, 2842, 1641, 1514, 1456, 1379, 1286, 723, 682.

n-tetradecyl-3-methylpyridinium bromide ([C_{14}mpy][Br])

The title compound was withe crystals. Yield: 95%. ^{1}H NMR ($CDCl_3$, 400 MHz), δ: 9.433 (s, 1H), 9.288 (d, 1H), 8.262 (d, 1H), 8.003 (t, 1H), 4.959 (t, 2H), 2.648 (s, 3H), 2.024 (t, 2H), 1.478~1.132 (m, 22H), 0.866 (t, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz), δ: 145.53, 144.66, 142.28, 139.63, 127.70, 61.79, 31.92, 29.68, 29.64, 29.60, 29.53, 29.36, 26.11, 22.69, 18.76, 14.13. FTIR (KBr), ν/cm^{-1}: 3006, 2919, 2847, 1631, 1502, 1467, 1369, 1236, 728, 682.

n-hexadecyl-3-methylpyridinium bromide ([C_{16}mpy][Br])

The title compound was withe crystals. Yield: 95%. ^{1}H NMR ($CDCl_3$, 400 MHz), δ: 9.475 (s, 1H), 9.299 (d, 1H), 8.264 (d, 1H), 8.031 (t, 1H), 4.934 (t, 2H), 2.634 (s, 3H), 2.015 (t, 2H), 1.438~1.009 (m, 26H), 0.848 (t, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz), δ:145.56, 144.66, 142.31, 139.60, 127.77, 61.73, 32.04, 31.91, 29.68, 29.65, 29.61, 29.53, 29.37, 26.10, 22.68, 18.73, 14.12. FTIR (KBr), ν/cm^{-1}: 3006, 2919, 2847, 1626, 1514, 1472, 1375, 1286, 718, 682.

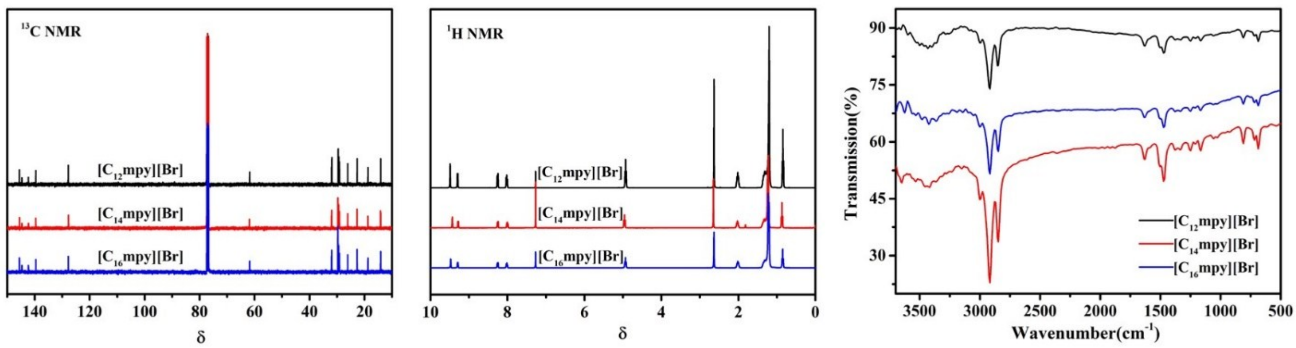

Fig. S1. (^{1}H, ^{13}C) NMR and FTIR spectrum of synthesized [$C_n$mpy][Br].

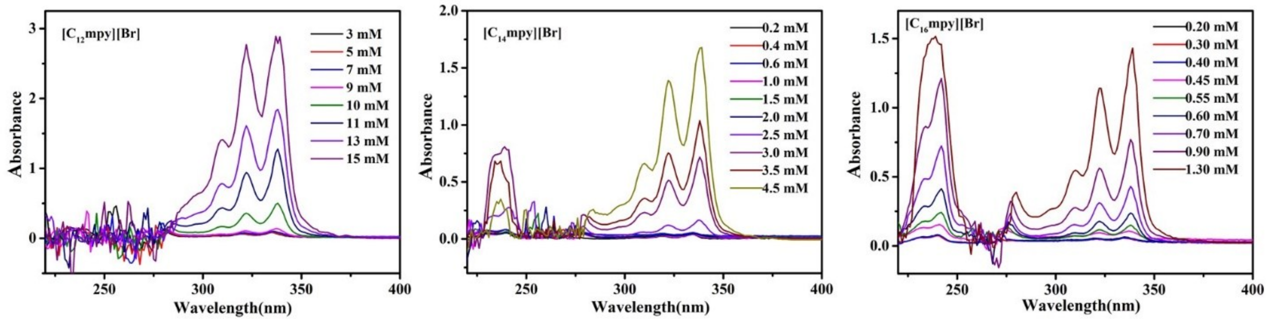

Fig. S2. The plots of absorption intensity vs. various concentrations of ILs solutions containing pyrene.

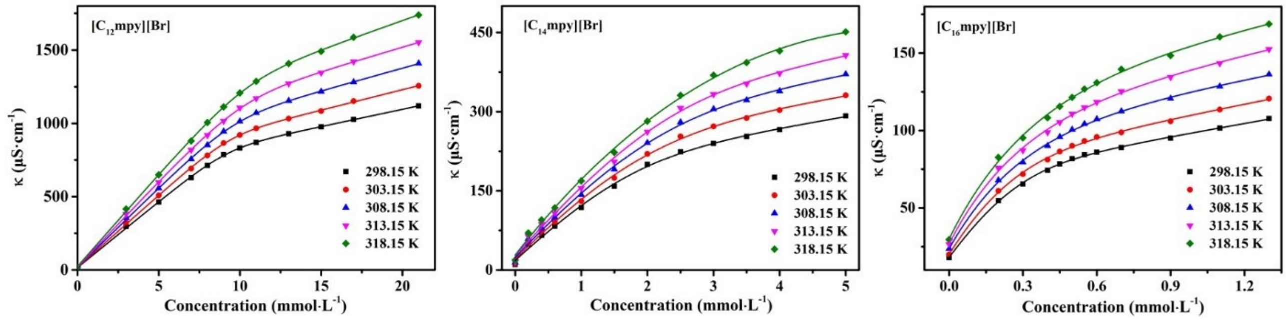

Fig. S3. Conductivity dependence of concentration for ILs in the presence of LiBr at different temperature.

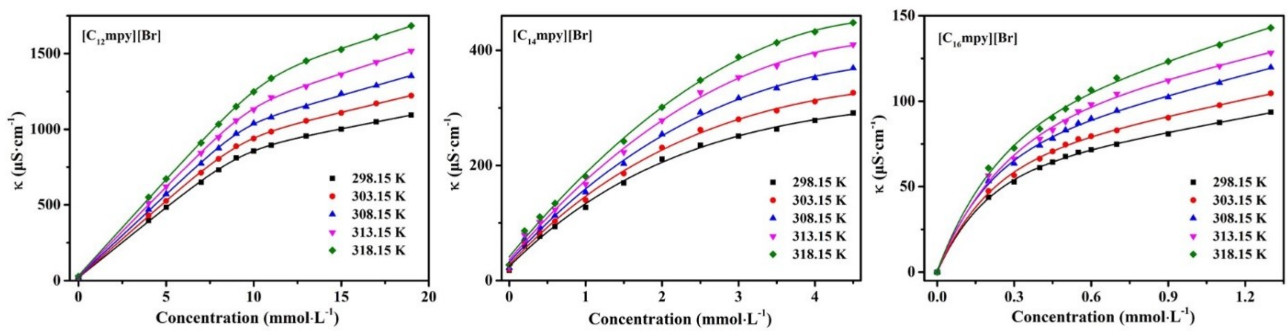

Fig. S4. Conductivity dependence of concentration for ILs in the presence of NaBr at different temperature.

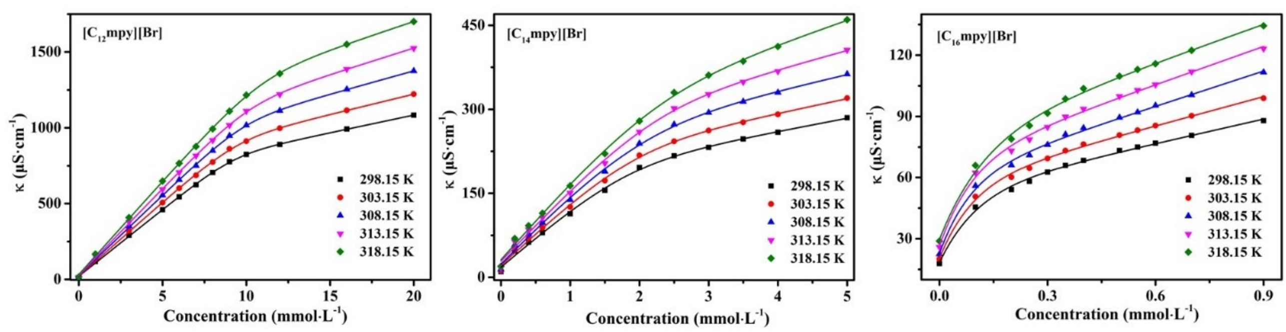

Fig. S5. Conductivity dependence of concentration for ILs in the presence of $MgBr_2$ at different temperature.

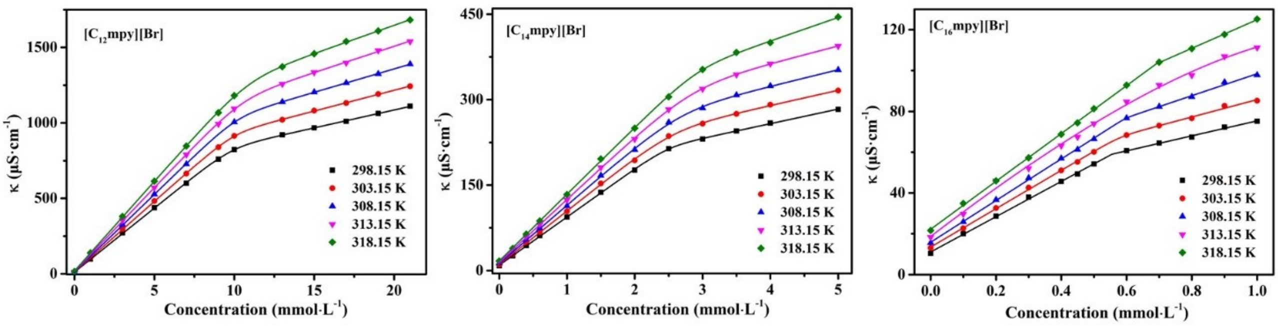

Fig. S6. Conductivity dependence of concentration for ILs in the presence of C_2H_5OH at different temperature.

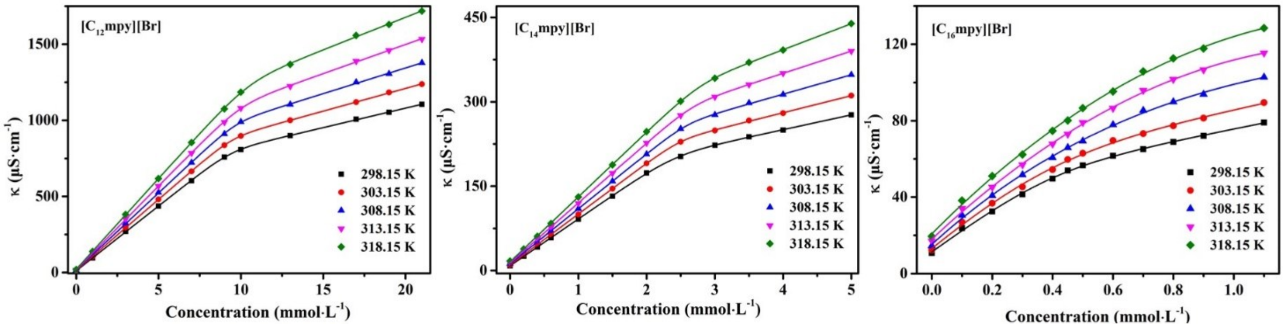

Fig. S7. Conductivity dependence of concentration for ILs in the presence of C_3H_7OH at different temperature.

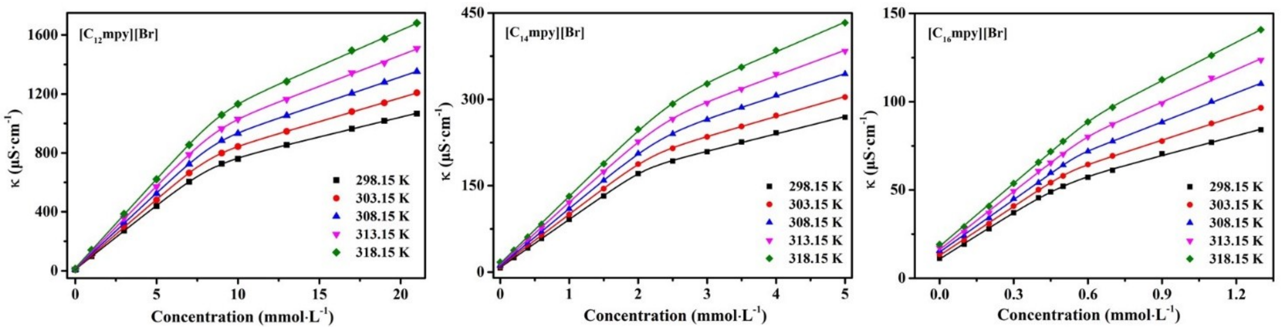

Fig. S8. Conductivity dependence of concentration for ILs in the presence of C_4H_9OH at different temperature.

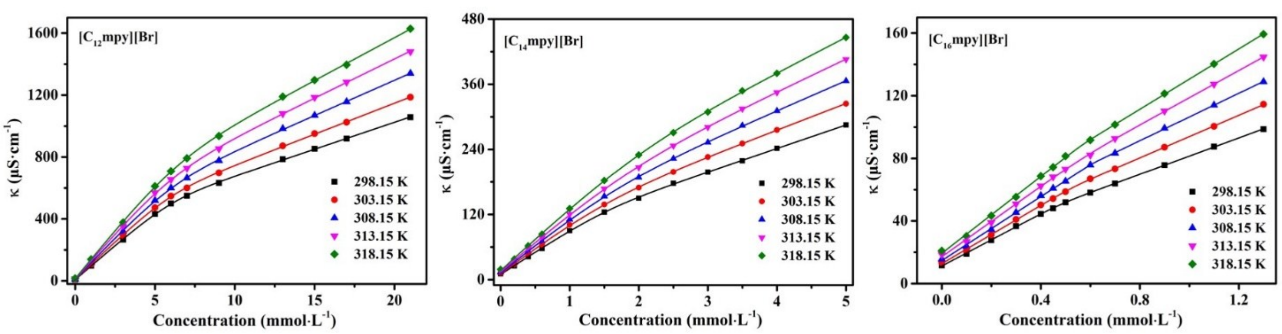

Fig. S9. Conductivity dependence of concentration for ILs in the presence of $C_5H_{11}OH$ at different temperature.

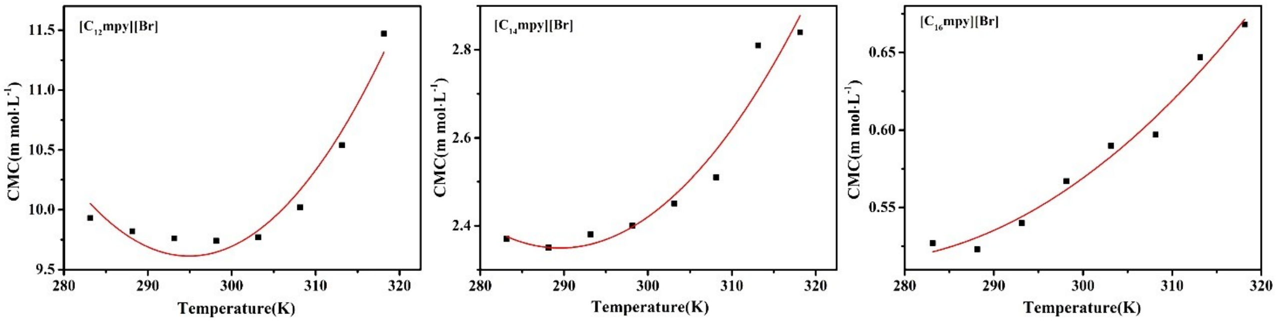

Fig. S10. The dependence of the CMC on temperature for ILs

Table 1S. Coefficients of polynomials log X_{CMC}=A+ BT + CT^2; the temperature T^*(CMC), at the minimum critical micelle concentration, cmc* and T_0 at ΔH_m^{ϑ}=0.

	A	B	C	CMC*	T^*	T_0
[C_{12}mpy][Br]	7.57146	-0.0761	1.302×10^{-4}	9.61	295.00	292.31
[C_{14}mpy][Br]	4.36697	-0.0606	1.048×10^{-4}	2.35	288.72	287.90
[C_{16}mpy][Br]	1.54843	-0.0276	4.857×10^{-5}	0.521	283.20	285.16

[a] Units: T(K); B(K^{-1}); C(K^{-2}); T*, T_0(K); CMC*(mmol·L^{-1})