

Table S1. Zeta potential measurements of the different systems (rock, brine, ILs).

| Sample | Systems | ζ -potential (mV) | |
|--------|--|-------------------------|--------|
| | | 25°C | 80°C |
| 1 | DI+rock | -0.96 | -0.64 |
| 2 | DI+rock+500 ppm [C ₁₂ mim] ⁺ [Cl] ⁻ | +7.89 | +7.33 |
| 3 | SW+rock | +18.8 | +18.25 |
| 4 | SW+rock+500 ppm [C ₁₂ mim] ⁺ [Cl] ⁻ | +58.96 | +58.55 |
| 5 | SW+rock+500 ppm [C ₈ mim] ⁺ [Cl] ⁻ | +55.36 | +54.33 |
| 6 | SW+rock+500 ppm [C ₆ mim] ⁺ [Cl] ⁻ | +53.82 | +53.13 |
| 7 | SW+rock+500 ppm [C ₄ mim] ⁺ [Cl] ⁻ | +51.71 | +51.25 |

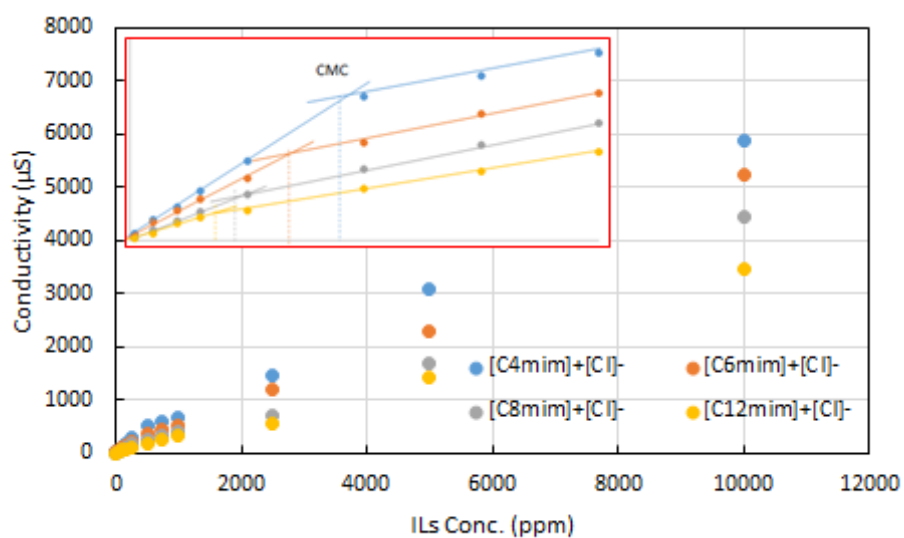


Figure S1. Electrical conductivity of different ILs in deionized water at various concentration in 25°C.