Electronic Supplementary Information (ESI)

Masking specific effects of ionic liquid constituents at the solid-liquid interface by surface functionalization

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Refractometry

The refractive index (n) of the IL solutions was measured with an Abbemat 3200 automatic one-wavelength refractometer (Anton Paar, Austria) at a wavelength of 589 nm. For the evaluation of the light scattering data, the n values were interpolated with a linear fit according to

$$n = c_{IL}a + b \tag{S1}$$

where c_{IL} is the molar concentration of the ILs, while a and b are the fitting parameters given in Table S1.

Viscosimetry

The viscosity (η) data of the IL solutions were measured with a traditional glass capillary viscometer in flow-through mode. For later calculations, the viscosity data were interpolated by following the protocol detailed in H. D. B. Jenkins et al., *Chem. Rev.*, 1995, **95**, 2695-2724 as

$$\eta/\eta_0 = 1 + A\sqrt{c_{IL}} + Bc_{IL} + Dc_{IL}^2 \tag{S2}$$

where η_0 is the viscosity of water (8.90×10^{-4} Pa·s at the respective temperature), while A, B and D are constants listed in Table S1.

Table S1. Fitting parameters used to interpolate the refractive indices and viscosities of the IL solutions.

Composition	Refractive Index[a]		Viscosity[b]		
	a (M^{-1})	b	A ($M^{-1/2}$)	B (M^{-1})	D (M^{-2})
BMIMAc	3.01×10^{-5}	1.33247	0.0029	6.72×10^{-9}	1.02×10^{-6}
$BMIMNO_3$	2.86×10^{-5}	1.33250	0.0029	-3.4×10^{-10}	3.66×10^{-7}
BMIMBr	3.46×10^{-5}	1.33248	0.0029	-3.3×10^{-10}	4.17×10^{-7}
BMIMCl	2.92×10^{-5}	1.33248	0.0029	-1.0×10^{-4}	7.76×10^{-7}

Fitting parameters of equations S1[a] and S2[b].

Table S2. Characteristic aggregation and charge data of AL and SL-IP-2 particles measured in KCl and IL solutions.

Salts	AL			SL-IP-2		
	CCC (mM)[a]	σ (mC/m^2)[b]	ζ (mV)[c]	CCC (mM)[a]	σ (mC/m^2)[b]	ζ (mV)[c]
KCl	80	3.5	5.4	90	4.5	6.2
BMIMAc	6	0.5	2.8	100	7.5	10.0
$BMIMNO_3$	40	2.5	5.5	100	7.5	10.0
BMIMBr	50	3.0	5.9	100	7.5	10.0
BMIMCl	90	6.0	8.3	100	7.5	10.0

[a]Critical coagulation concentration calculated by equation 10. [b]Surface charge density determined with equation 2. [c]Zeta potential at the CCC.

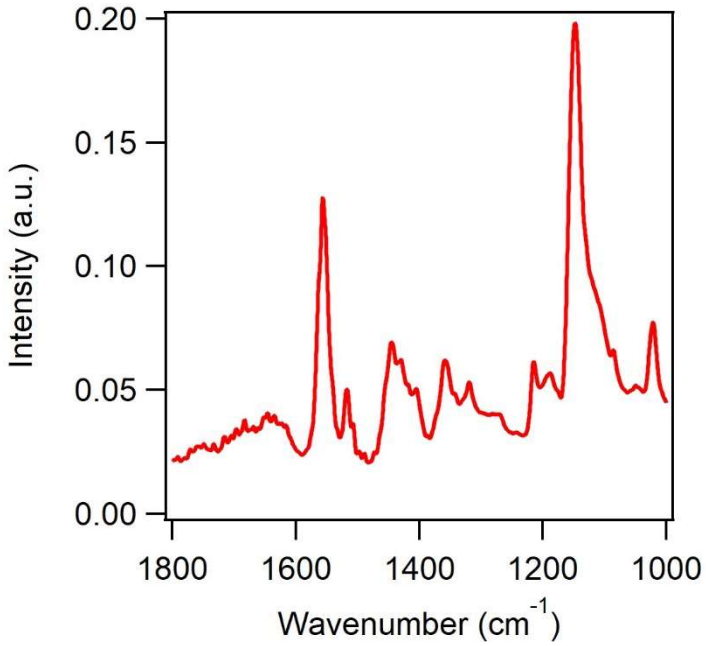

Fig. S1 FT-IR spectrum of the IP-2 polymer synthesized using the protocol described in Zhong et al., *ChemSusChem,* 2017, **10**, 2728-2735.

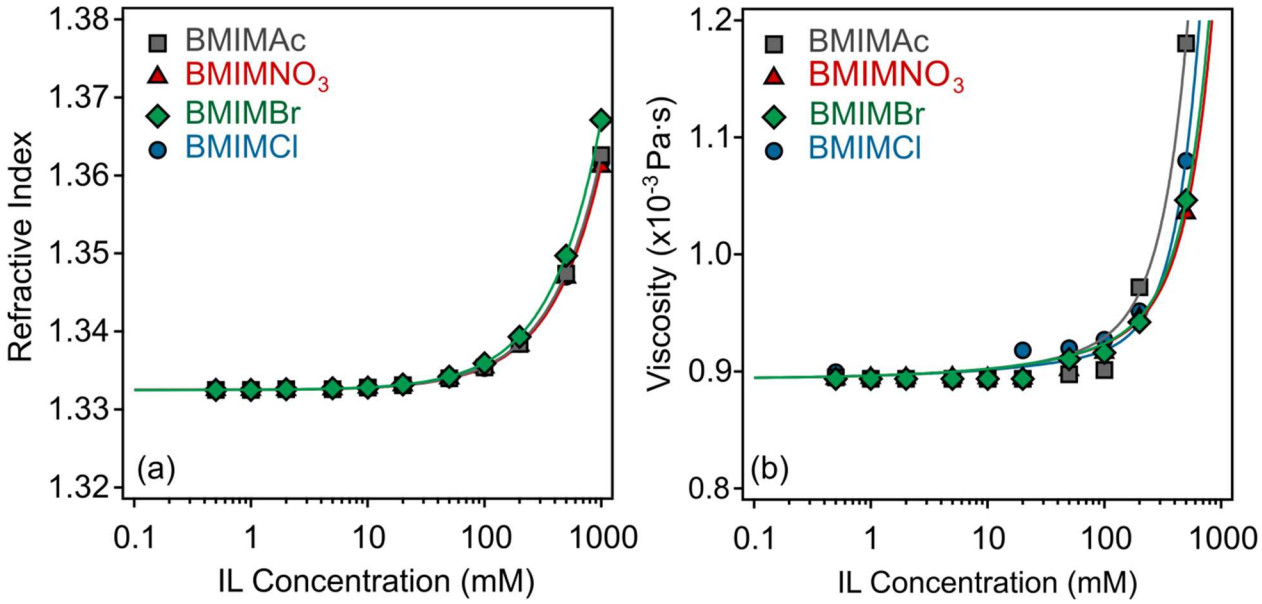

Fig. S2 Refractive indices (a) and viscosities (b) of aqueous IL (BMIMAc, $BMIMNO_3$, BMIMBr and BMIMCl) solutions of different concentrations at pH 4. The solid lines are fits using equations S1 (a) and S2 (b) and they were applied for data interpolation.

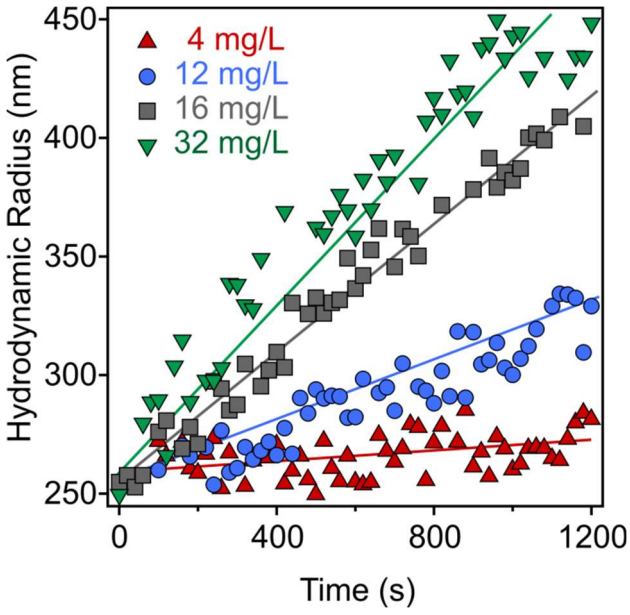

Fig. S3 Time-resolved DLS measurements at different AL concentrations in 1 M KCl at pH 4. The solid lines are linear fits used to calculate the aggregation rate constants, which were obtained using equation 7.

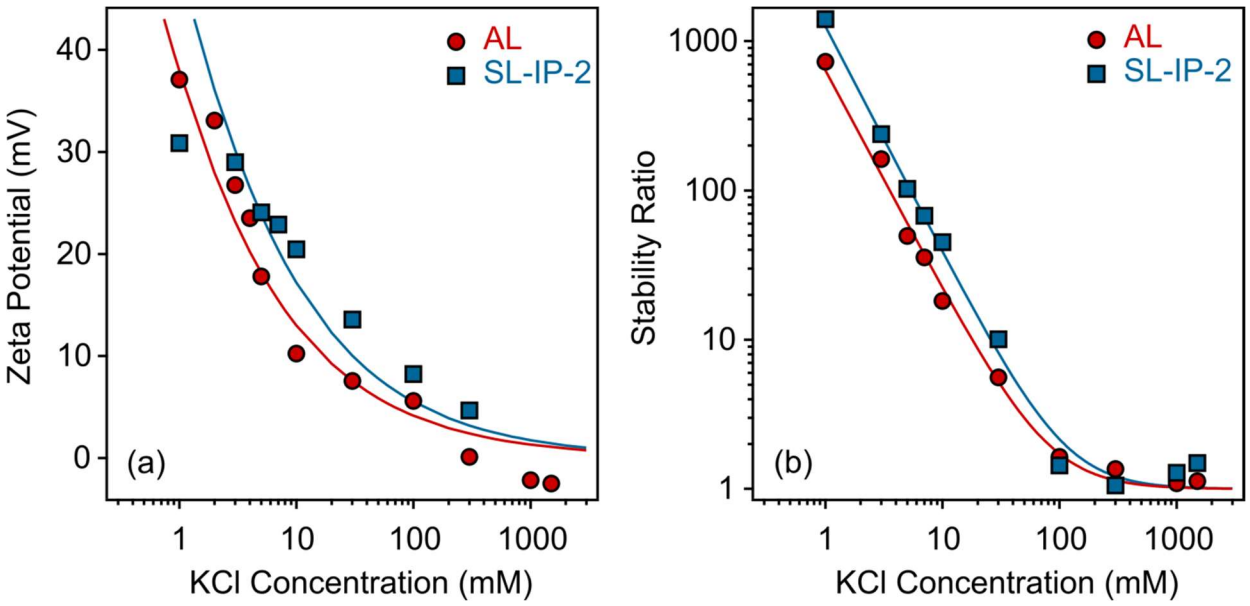

Fig. S4 Zeta potential (a) and stability ratio (b) of AL (red circles) and SL-IP-2 (blue squares) particles at different KCl concentrations. The measurements were performed at pH 4. The lines are the results of calculations using equations 2 (a) and 10 (b).

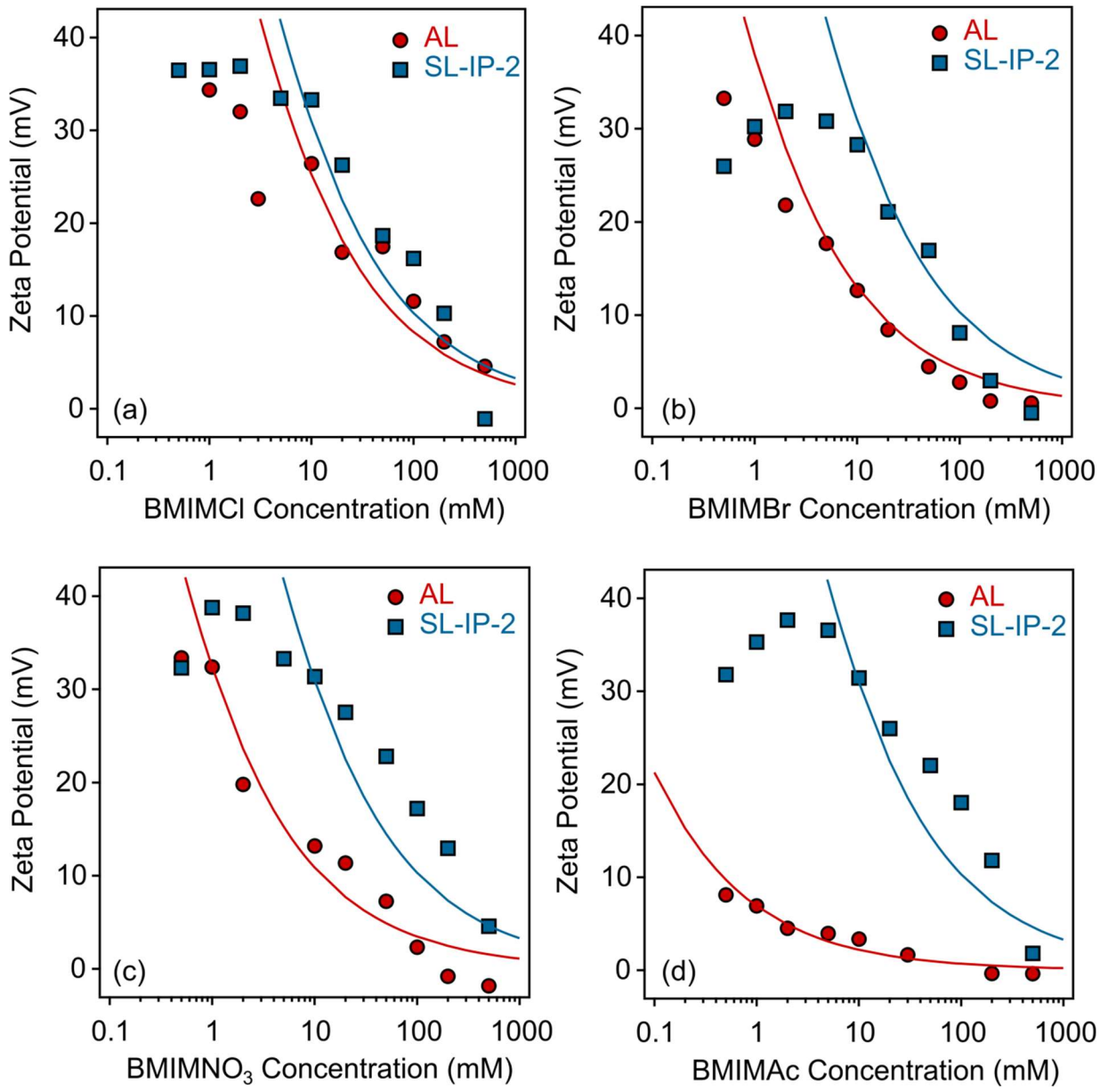

Fig. S5 Zeta potentials of AL (red circles) and SL-IP-2 (blue squares) particles as a function of the concentration of BMIMCl (a), BMIMBr (b), BMIMNO3 (c) and BMIMAc (d) at pH 4. The solid lines were calculated with equation 2.

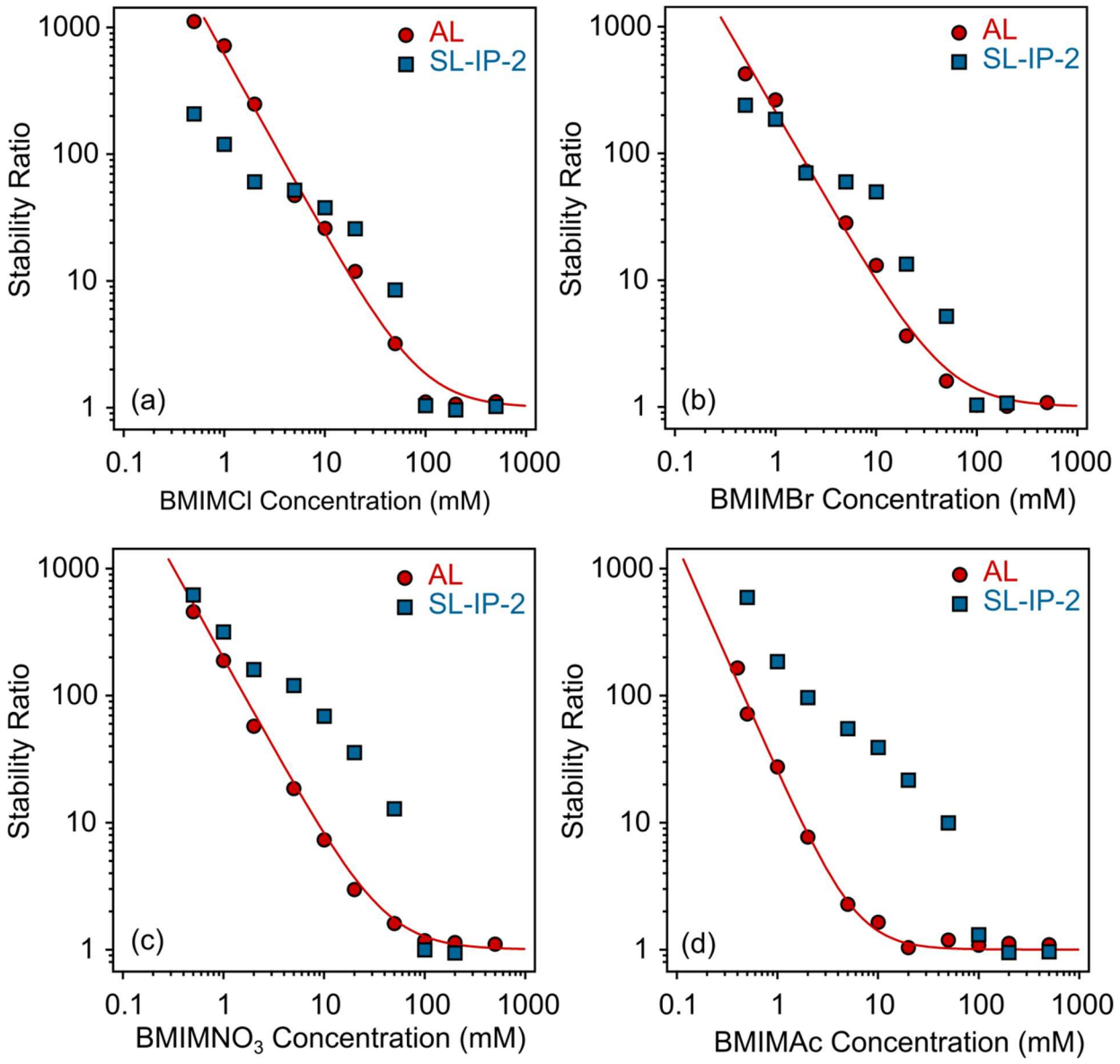

Fig. S6 Stability ratios of AL (red circles) and SL-IP-2 (blue squares) as a function of the concentration of BMIMCl (a), BMIMBr (b), $BMIMNO_3$ (c) and BMIMAc (d) at pH 4. The solid lines were calculated with equation 10.