Electronic Supplementary Information

A study combining magic-angle spinning NMR and small-angle X-ray scattering on the interaction in the mixture of poly(benzyl methacrylate) and ionic liquid 1-ethyl-3-methylimidazolium bis(trifluoromethanesulfonyl)amide

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Overlap concentration

On the basis of the Guinier approximation,[1] the radius of gyration, R_g, of the PBnMA chain was evaluated to be 3.6±0.1, 4.5±0.2 and 5.8±0.5 nm for the polymers with M_w = 18, 27 and 40 kDa, respectively. The Guinier plots of the SAXS profiles for the polymer with M_w = 18, 27 and 40 kDa are shown in Fig. S1. The R_g values were determined by iteration with checking the consistency between the evaluated R_g value and the appropriate q-region as determined on the basis of $1/R_g$. The overlap

concentrations, c^*, for the polymers with M_w = 18, 27 and 40 kDa were approximately estimated to be 0.16, 0.12 and 0.080 g/mL (corresponding to *ca*. 16, 12 and 8.0 wt%), respectively, using the equation $c^* = 3M_w/(4\pi N_A R_g^3)$, where N_A is the Avogadro's number.[2,3] Considering the estimated concentrations, the concentration studied here was sufficiently low compared with c^*.

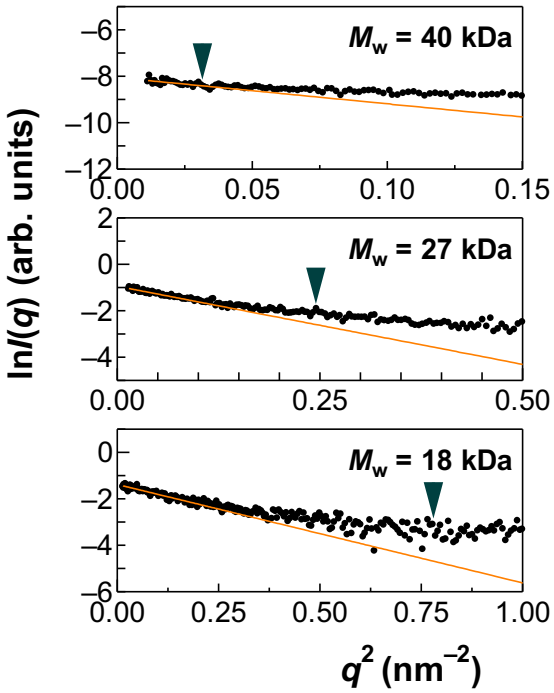

Fig. S1: The Guinier plots, ln$I(q)$ vs. q^2, of the SAXS profiles for PBnMA in [C_2mim][NTf_2]. Solid lines represent the determined slope for evaluation of radius of gyration, R_g, using the appropriate small-angle region below $q = 1/R_g$. Green arrows indicate the appropriate q-region as determined on the basis of $1/R_g$.

Concentration dependence of radius of gyration

Fig. S2 shows concentration dependence of the evaluated R_g for the polymer of M_w = 18 kDa. The R_g values at concentrations of 0.10, 0.25 and 1.0wt% were evaluated using the Guinier approximation.[1] Although the concentration of 1wt% is considered as sufficiently low compared with c^*, the R_g values showed concentration dependence and increased with decreasing the concentration. The tendency identified in Fig. S2 is normally observable in solution systems.[4]

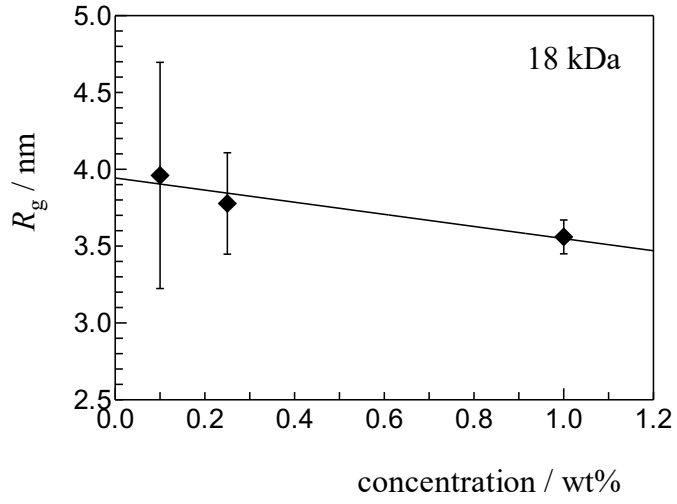

Fig. S2: Concentration dependence of R_g for PBnMA with M_w = 18 kDa in [C_2mim][NTf_2].

Fig. S3 shows dependence of the infinite dilution radius of gyration, $R_g(c \to 0)$, on the molecular weight. The molecular weights were set at M_w = 18, 27, 40 and 78 kDa.

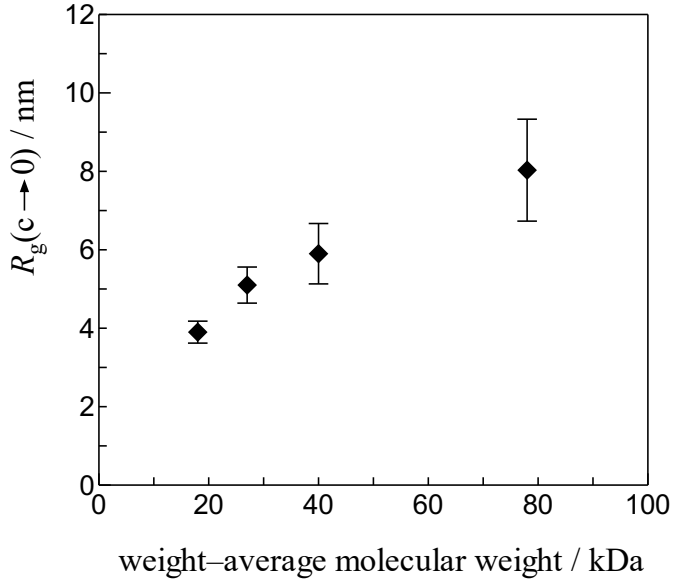

Fig. S3: Dependence of $R_g(c \to 0)$ on molecular weight of PBnMA.

References

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4. O. Glatter and O. Kratky, *Small Angle X-Ray Scattering*; Academic Press: New York, 1982.