SUPORTING INFORMATION

Preparation of poly(ionic liquid) nanoparticles and their novel application as flocculants for water purification

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Synthesis of the RAFT agent

Detailed synthesis procedure is explained elsewhere.[1] 15 g of potassium ethyl xanthogenate was mixed with 13.6 g of (1-bromoethyl) benzene in the presence of ethanol as the reaction solvent (15% solids content). The reaction was conducted for 4 hours and 250 ml of distilled water was introduced. Liquid-liquid extraction was performed with dichloromethane. The yellowish liquid product was dried over magnesium sulfate and the structure was confirmed by ^{1}H NMR.

1-Vinyl-3-ethylimidazolium bromide monomer synthesis

The monomer was synthesized by quaternizing 1-vinylimidazole with bromoethane. In a typical reaction, 5 g of 1-vinylimidazole was mixed with 7 g of bromoethane at 40°C. Upon the solidification of the product, 4 ml of DMF was introduced. After 24 hours the crude product was washed with excess ethylacetate and dried under reduced pressure. The structure of the monomer was confirmed by ^{1}H NMR.

Synthesis of Poly (1-Vinyl-3-ethylimidazolium bromide) (PViEtImBr)

In a typical polymerization reaction, 1 g of viniylethylimidazolium bromide was introduced into a 25 ml one-neck-round-bottom flask and 37.1 mg of RAFT agent was introduced with 4 ml of DMF. Nitrogen was passed through the reactor which was immersed in an oil bath at 70°C. Then 5 mg of AIBN initiator dissolved in 1 ml of DMF was introduced to the reaction mixture in one shot. The reaction was conducted for 24 hours. The crude product was washed with dichloromethane and analyzed by ^{1}H NMR to confirm the formation of the polymer.

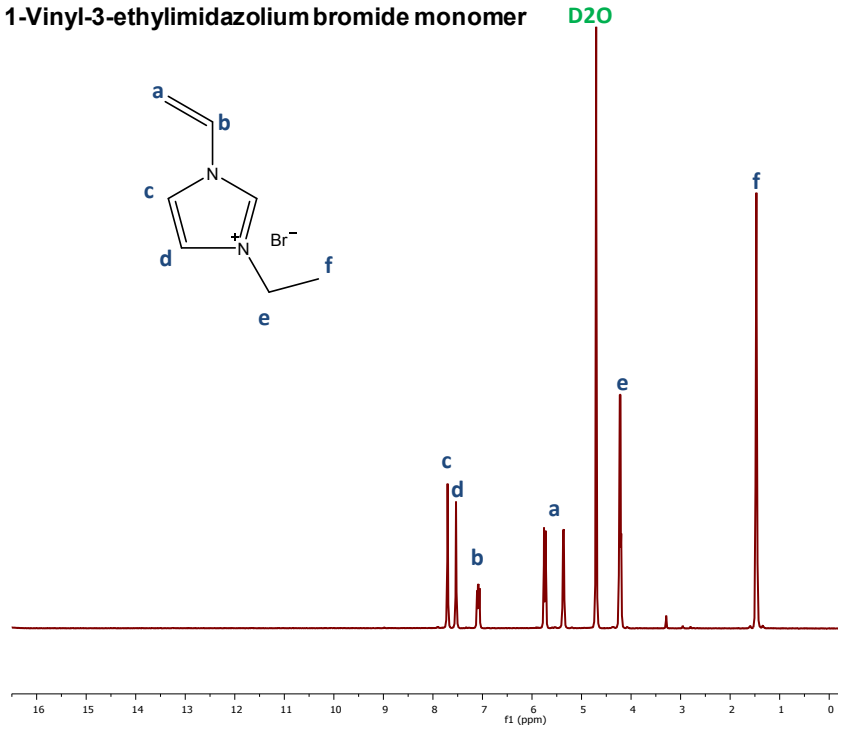

Fig. S1 ^{1}H NMR Spectra of 1-Vinyl-3-ethylimidazolium bromide monomer.

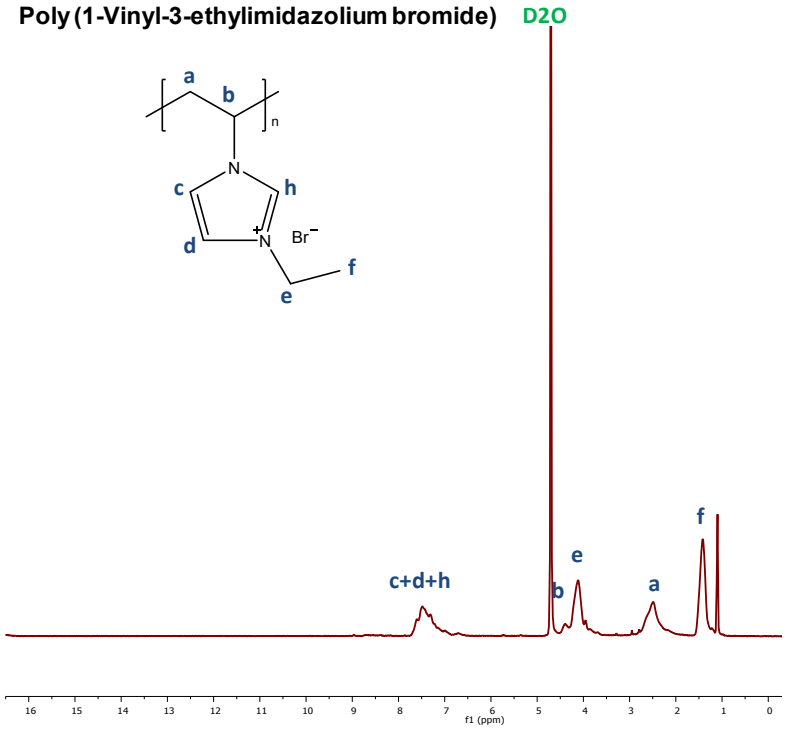

Fig. S2 ^{1}H RMN Spectra of Poly (1-Vinyl-3-ethylimidazolium bromide).

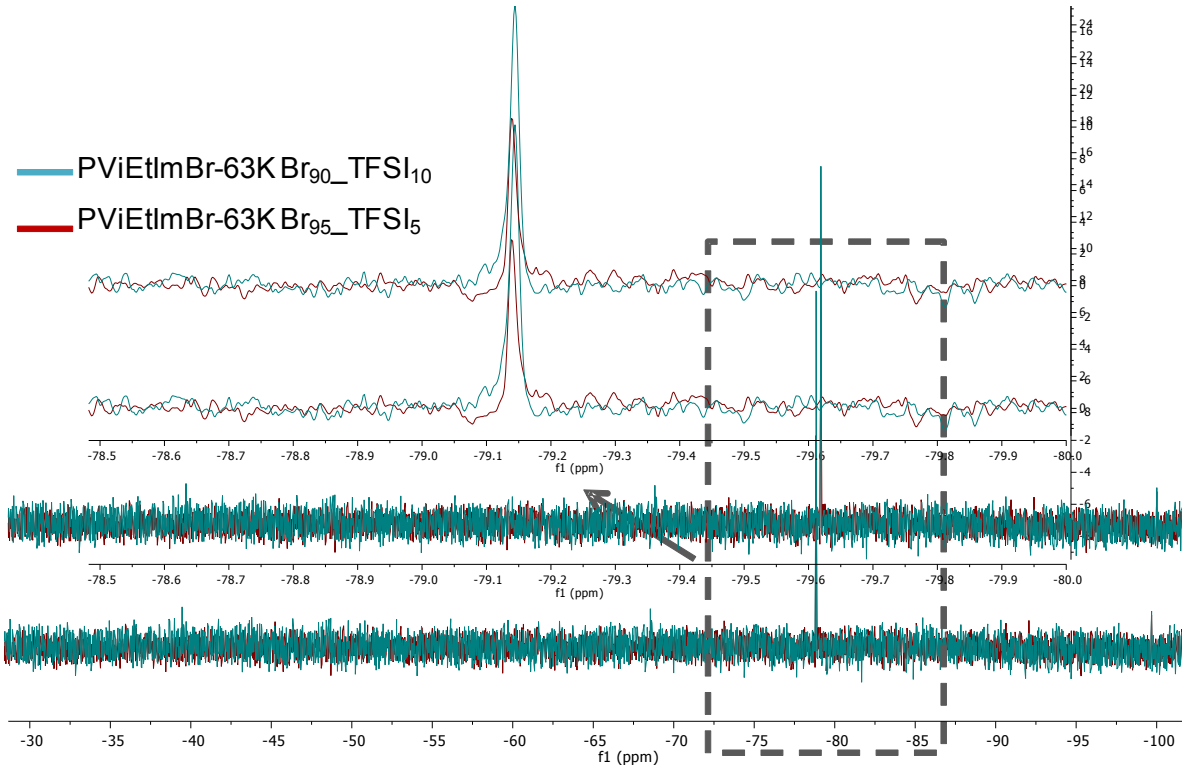

Fig. S3 ^{19}F RMN Spectra of PViEtImBr-63K $_{90}$ TFSI $_{10}$ and PViEtImBr-63K $_{90}$ TFSI $_{5}$.

Table S1 Elemental analysis results of the PolyViEtImBr-20K$_{100}$, PolyViEtImBr-20K$_{90}$TFSI$_{10}$, PolyViEtIm-20K TFSI$_{100}$. Numbers in parenthesis are theoretical values.

Code	C	H	N	S
PolyViEtImBr-20K$_{100}$	41.0 (41.4)	5.7 (5.5)	13.7 (13.7)	-
PolyViEtImBr-20K $_{90}$ TFSI$_{10}$	36.7 (34.5)	5.9 (4.0)	12.0 (10.6)	2.3 (2.3)
PolyViEtIm-20K TFSI$_{100}$	28.7 (26.8)	2.9 (2.7)	10.6 (10.4)	14.7 (15.9)

Fig. S4 Stability of the diluted dispersion of silica obtained though light scattering by use of TURBISCAN LAb^{expert}, during 10 hours at ambient temperature.

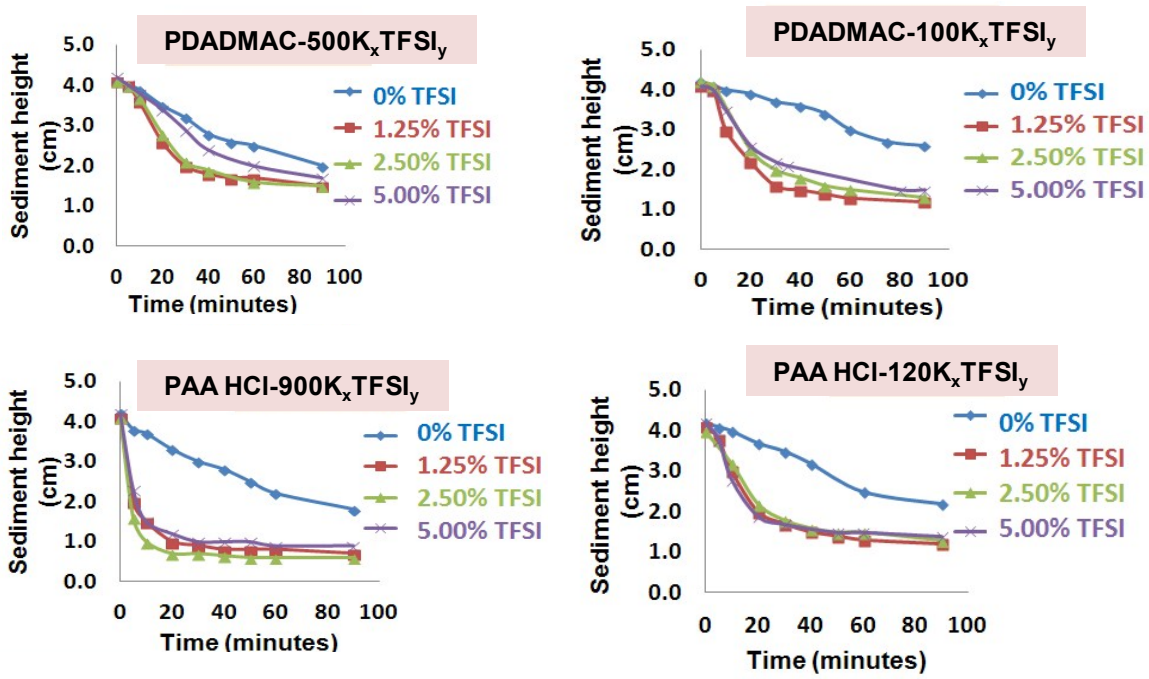

Fig. S5 Evolution rate of the sediment for PDADMAC-500K$_x$TFSI$_y$, PDADMAC-100K$_x$TFSI$_y$, PAAHCl-900K$_x$TFSI$_y$ and PAAHCl-120K$_x$TFSI$_y$ series.

References

1- H. Mori, M. Yahagi, T. Endo, Macromolecules, **2009**, 42, 8082-8092.