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Copolymers of Ionic Liquids with Polymeric or Metallocomplex Chromophores for Quasi-Solid State DSSC Applications

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Synthetic Procedures

Synthesis of Monomer VBMImT[1]

2.05 g (1.98 mL, 25 mmol) of 1-methylimidazole was dissolved in acetonitrile (6 mL), followed by the addition of 4-chloromethylstyrene (4.93 mL, 5.34 g, 35 mmol). The mixture was heated at 50 ^{o}C for 24 h. After cooling at room temperature, the mixture was poured into diethylether (Et_2O) and placed in a freezer for 2 h. The ether phase was decanted and the product was dissolved in H_2O. 2.7 g of sodium tetrafluoroborate ($NaBF_4$) was then added to the aqueous phase and an oily liquid phase was formed. The oily phase was extracted using ethyl acetate (EtOAc) and H_2O. The organic phase was dried using anhydrous magnesium sulfate ($MgSO_4$) which was removed by filtration, while the filtrate was reduced by rotary evaporation and finally dried under vacuum overnight (40 ^{o}C).

Synthesis of Monomer VHImBr[2]

Under vigorous stirring, 8.55 g (7.27 mL, 51.81 mmol) of 1-bromohexane was added dropwise to 1-vinylimidazole (4.21 mL, 30 mmol) in a 50 mL, two-necked, round-bottom flask. The mixture was refluxed for 20 h. After cooling to room temperature, the formed solid was washed several times with EtOAc. The product was filtered and dried under vacuum overnight

Figures

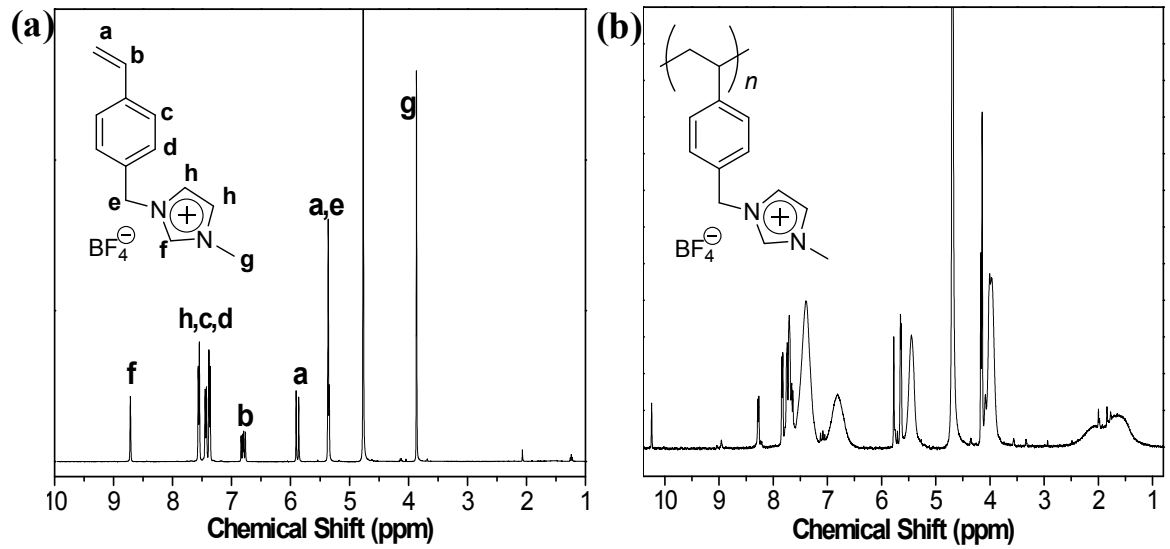

Figure S1: ^{1}H NMR spectra of VBMImT **(a)** and PVBMImT **(b)** in MeOH-d_1.

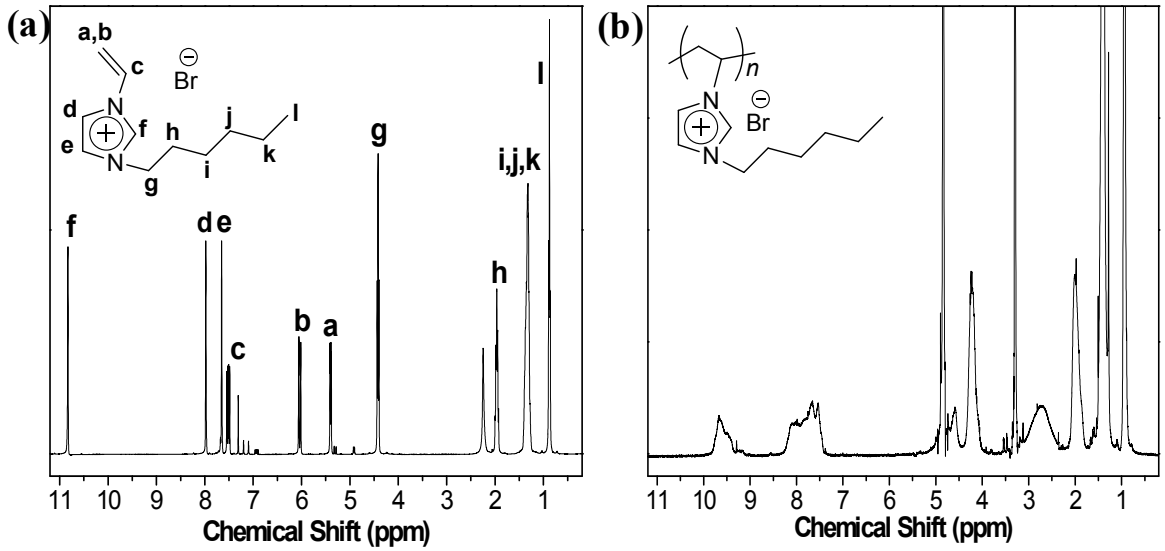

Figure S2: ^{1}H NMR spectra of VHImBr in $CDCl_3$ **(a)** and PVHImBr in MeOH d_1 **(b)**.

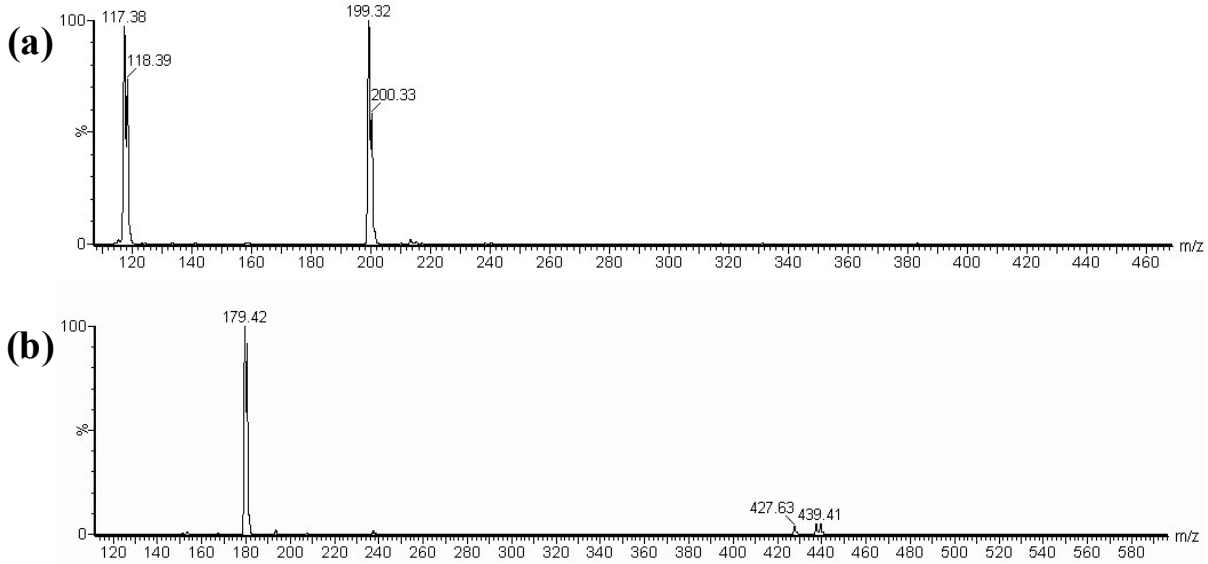

Figure S3: ESI-MS spectra of VBMImT **(a)** and of VHImBr **(b)**.

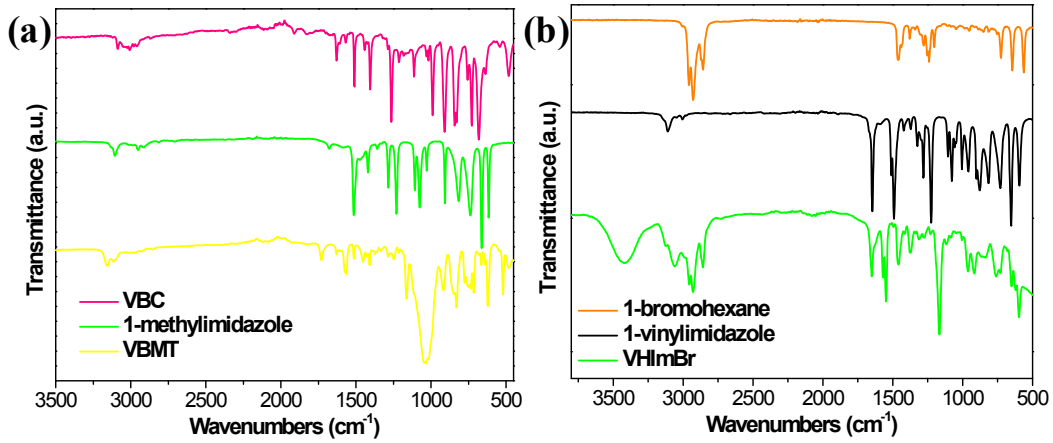

Figure S4: ATR spectra of VBMImT **(a)** and of VHImBr **(b)** in comparison to the starting materials in each case.

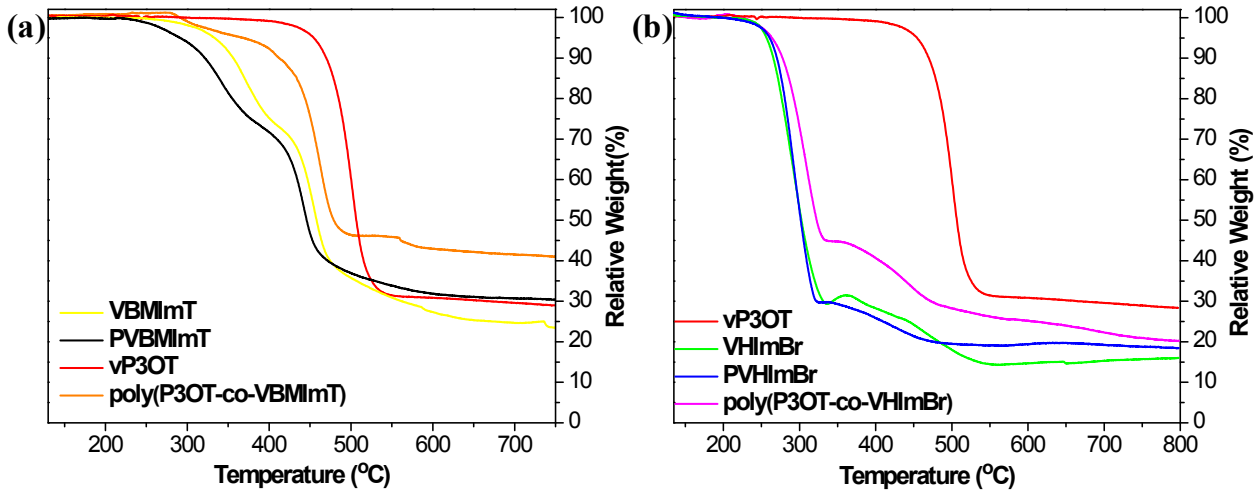

Figure S5: TGA curves of poly(P3OT-co-VBMImT) **(a)** and poly(P3OT-co-VHImBr) **(b)** in comparison to the starting materials and the respective PIL homopolymers.

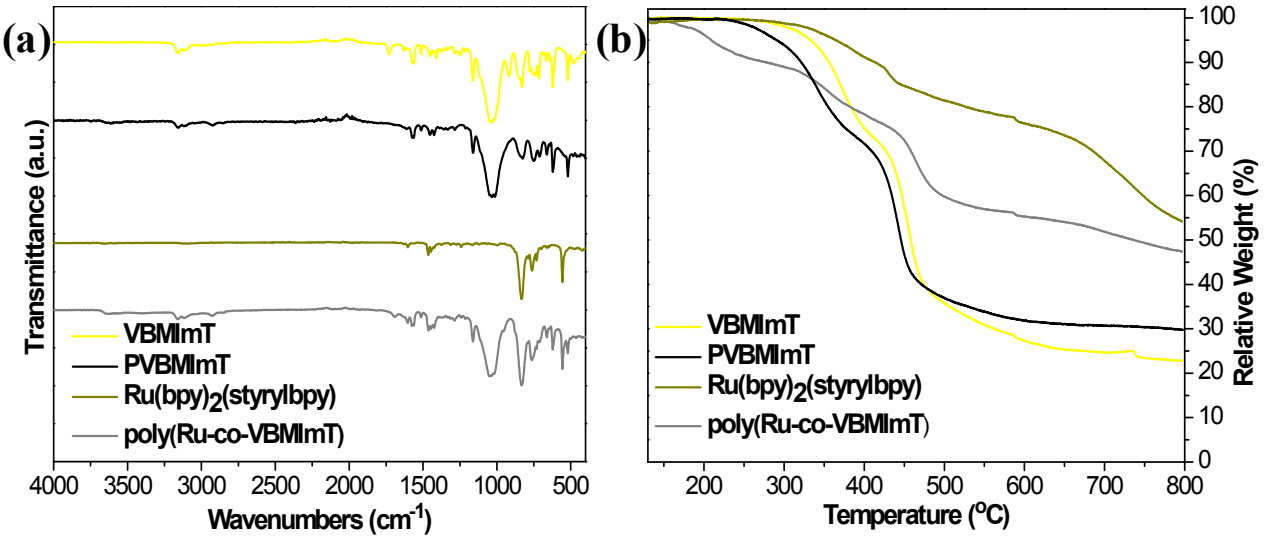

Figure S6: ATR spectra **(a)** and TGA thermograms **(b)** of VBMImT, PVBMImT, Ru(bpy)$_2$(styrylbpy) and poly(Ru-co-VBMImT).

References

[1] W. S. Chi, J. K. Koh, S. H. Ahn, J.-S. Shin, H. Ahn, D. Y. Ryu and J. H. Kim, Electrochem. Commun., 2011, **13**, 1349–1352 (DOI: 10.1016/j.elecom.2011.08.005)

[2] R. Marcilla, J. A. Blazquez, J. Rodriguez, J. A. Pomposo and D. Mecerreyes, J. Polym. Sci. Part A: Polym. Chem., 2004, **42**, 208–212 (DOI: 10.1002/pola.11015)