Supporting Information

Anionic Polymerization of Oxadiazole-containing 2-Vinylpyridine by Precisely Tuning Nucleophilicity and the Polyelectrolyte Characteristics of the Resulting Polymers

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Figure S1. $^{13}$C-NMR spectra of PVPyOzP using CDCl$_3$. Denoted by * is tetrahydrofuran (THF) solvent.
Figure S2. The polymeric solution of PVPyOzP synthesized via anionic polymerization using (A) only TPM-K (shown in the main manuscript) and (B) TPM-K/ZnEt₂ and TPM-K/BEt₃ in THF at −78 °C.
Figure S3. GPC curve of PVPyOzP using TPM-K/ZnEt$_2$ (Mn = 2,200 g/mol and PDI = 1.54).
Figure S4. GPC curve of PVPyOzP using TPM-K/BEt$_3$ (Mn = 7,500 g/mol and PDI = 1.19).
**Figure S5.** Solution colors of living PMMA and living PMMA-\textit{b}-PVPyOzP; (a) living PMMA and (d) living PMMA-\textit{b}-PVPyOzP of Entry 04, (b) living PMMA and (e) living PMMA-\textit{b}-PVPyOzP of Entry 05, and (c) living PMMA and (f) living PMMA-\textit{b}-PVPyOzP of Entry 06 in Table 3.
Figure S6. $^1$H-NMR spectra of poly(methyl methacrylate)-b-poly(2-phenyl-5-(6-vinylpyridin-3-yl)-1,3,4-oxadiazole) (PMMA-b-PVPyOzP) with molar ratio of (a) 1:17.35, (b) 1:2.88, and (c) 1:0.93 (Entry 04, 05, and 06 in Table 1).
Figure S7. Solution color of (a) living PVPyOzP and (b) living poly(2-Phenyl-5-(6-vinylpyridin-3-yl)-1,3,4-oxadiazole)-b-polyacrylonitrile (PVPyOzP-b-PAN) of Entry 07 in Table 3.
Figure S8. SEC curve of (A) PVPyOzP-\(b\)-PAN block copolymer with Mn = 788,000 g/mol and PDI = 1.41 and (B) remaining PVPyOzP homo polymer with Mn = 5,200 g/mol and PDI = 1.19 in PVPyOzP-\(b\)-PAN. (Entry 07 in Table 3).

The above SEC was run on a Waters system consisting of a Waters model 510 pump, a Rheodyne model 7725(i) injector with a Knauer Smartline model 2300 RI detector. DMF + 0.1M LiBr was used as the mobile phase in the following column set: four PSS (Polymer Standards Service) GRAM; 8x300 mm; 10\(\mu\)m; 100, 1000, and 3000 Å along with an 8x50, 10\(\mu\)m guard. The instrument was calibrated with a set of PS standards in the molecular weight range of 600 to 7,500,000 g/mol.
Figure S9. H-NMR spectra of PVPyOzP-b-PAN synthesized via sequential anionic polymerization. (Entry 07 in Table 3, Insert shows small portion of PVPyOzP in block copolymer of PVPyOzP-b-PAN)
Figure S10. FT-IR spectra of (A) parent VPyOzP, (B) QVPyOzP [I], and (C) QVPyOzP [Tf₂N] with range of wavelength from 670 to 3340 on the left and from 950 to 1650 cm⁻¹ on the right.
Figure S11. UV-Vis spectra of (A) parent VPyOzP, (B) QVPyOzP [I], and (C) QVPyOzP [Tf₂N]. The insert shows the UV-Vis spectra of (A), (B), and (C) in the range from 250 to 324 nm.
Figure S12. CO$_2$ adsorption (closed symbols) and desorption (open symbols) of QVPyOzP with iodide anion (I, squares) and triflate anion (Tf$_2$N, triangles).
**Figure S13.** CO$_2$ adsorption (closed symbols) and desorption (open symbols) of PQVPyOzP with iodide anion (I, squares) and triflate anion (Tf$_2$N, triangles).