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Controlled Radical Polymerization of *N*-Vinylphthalimide Using RAFT Process and Synthesis of Poly(vinyl amine)

Yuya Maki,[†] *Hideharu Mori,*[*†] *and Takeshi Endo*[*‡]

[†]Department of Polymer Science and Engineering, Faculty of Engineering, Yamagata University, 4-3-16, Jonan, Yonezawa, 992-8510, Japan

[‡]Molecular Engineering Institute, Kinki University, Iizuka, Fukuoka 820-8555, Japan

[*]To whom correspondence should be addressed. e-mail: h.mori@yz.yamagata-u.ac.jp and tendo@me-henkel.fuk.kindai.ac.jp, Phone: +81-238-26-3765, Fax: +81-238-26-3092

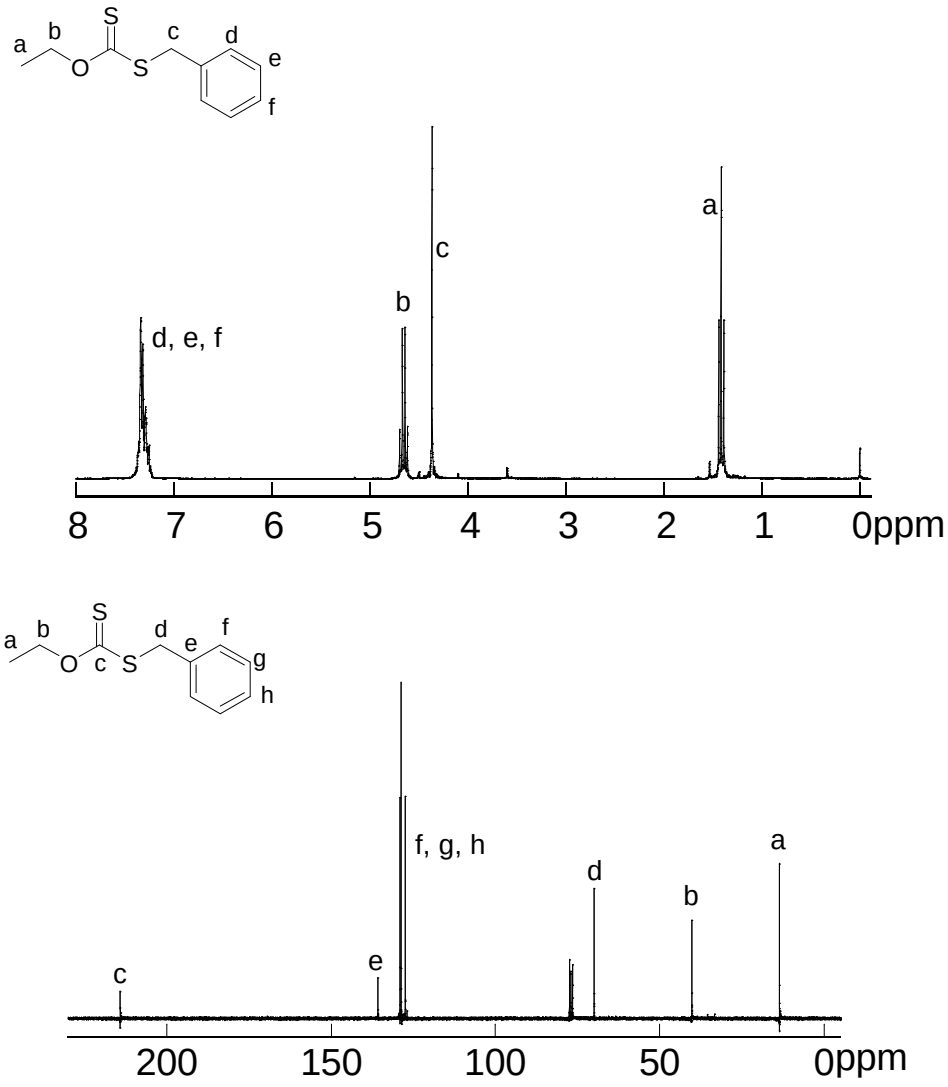

Figure S1. ^{1}H and ^{13}C NMR spectra of CTA 1 (270 MHz, $CDCl_3$). ^{1}H NMR: δ 1.36 (t, H_a, 3H), 4.58 (s, H_c, 2H), 4.89 (q, H_b, 2H), 7.32 (m, H_d, H_e, H_f, 5H). ^{13}C NMR: δ 14.2 (C_a), 47.7 (C_b), 70.3 (C_d), 128.5, 128.6, 129.1 (C_f, C_g, C_h,), 147.9 (C_e), 214.1 (C_c).

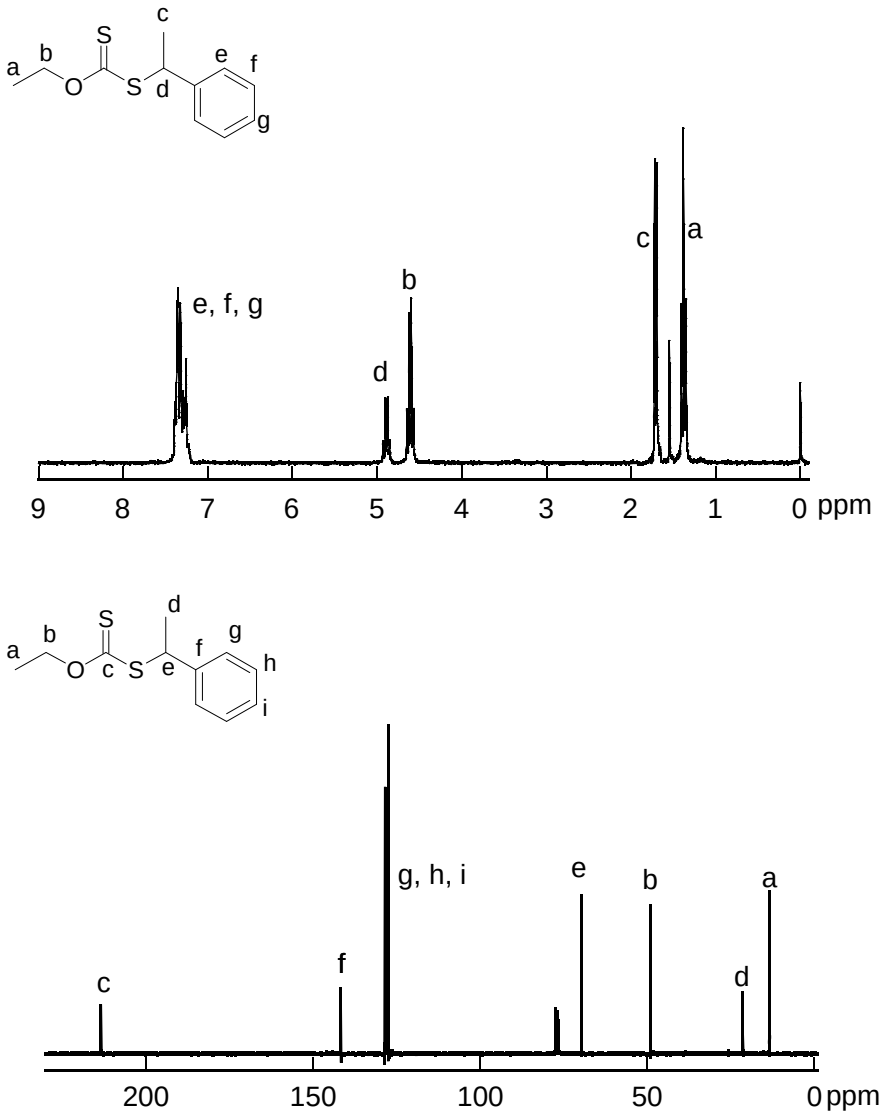

Figure S2. ^{1}H and ^{13}C NMR spectra of CTA 2 (270 MHz, $CDCl_3$). ^{1}H NMR: δ 1.36 (t, H_a, 3H), 1.70 (t, H_c, 3H), 4.58 (q, H_b, 2H), 4.89 (q, H_d, 1H), 7.32 (m, H_e, H_f, H_g, 5H). ^{13}C NMR: δ 14.2 (C_a), 22.1 (C_d), 49.7 (C_b), 70.3 (C_e), 128.1, 128.2, 129.2 (C_g, C_h, C_i,), 147.9 (C_f), 214.1 (C_c).

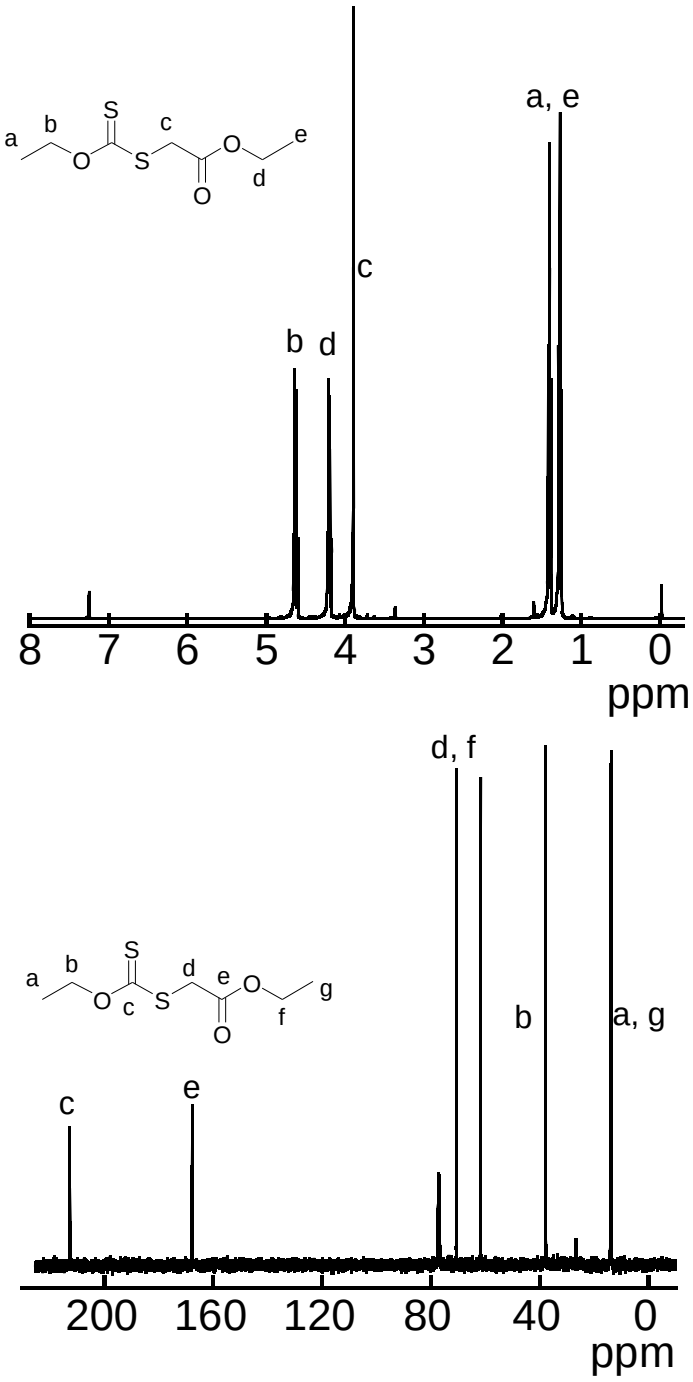

Figure S3. ^{1}H and ^{13}C NMR spectra of CTA 3 (400 MHz, $CDCl_3$). ^{1}H NMR: δ 1.27 (t, H_e, 3H, J = 6.9 Hz), 1.40 (t, H_a, 3H, J = 6.9 Hz), 3.90 (s, H_c, 2H), 4.20 (q, H_d, 2H, J = 7.3 Hz), 4.63 (q, H_b, 2H, J = 7.3 Hz). ^{13}C NMR: δ 13.8, 14.2 (C_a, C_g), 37.9 (C_b), 61.9 (C_f), 70.6 (C_d), 167.9 (C_e), 212.6 (C_c).

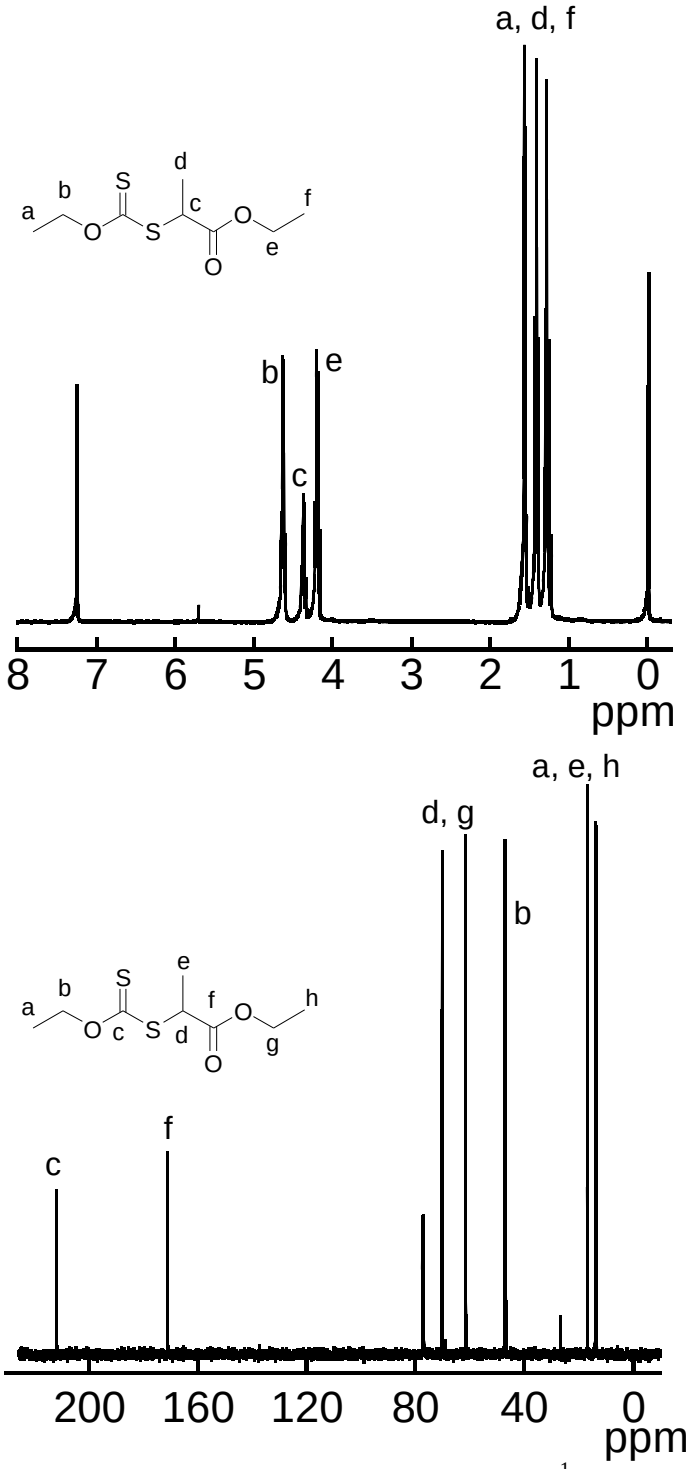

Figure S4. ^{1}H and ^{13}C NMR spectra of CTA 4 (400 MHz, $CDCl_3$). ^{1}H NMR: δ 1.27 (t, H_f, 3H, J = 7.3 Hz), 1.41 (t, H_d, 3H, J = 7.3 Hz), 1.56 (d, H_a, 3H, J = 7.3 Hz), 4.20 (q, H_e, 2H, J = 6.8 Hz), 4.37 (q, H_c, 1H, J = 7.8 Hz), 4.63 (q, H_b, 2H, J = 7.3 Hz). ^{13}C NMR: δ 13.7, 14.2, 16.9 (C_a, C_e, C_h), 47.2 (C_b), 61.7 (C_g), 70.2 (C_d), 171.3 (C_f), 212.0 (C_c).

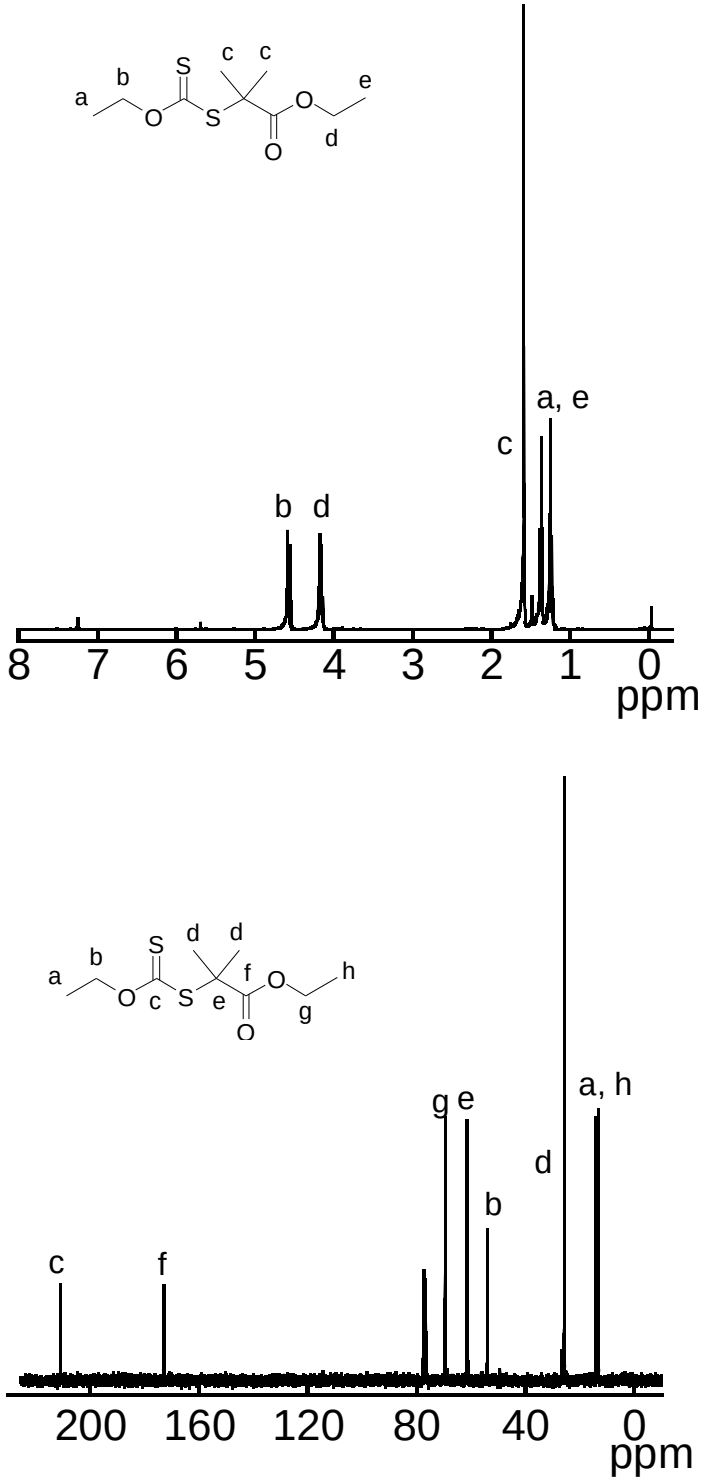

Figure S5. ^{1}H and ^{13}C NMR spectra of CTA 5 (400 MHz, $CDCl_3$). ^{1}H NMR: δ 1.25 (t, H_e, 3H, J = 7.3 Hz), 1.37 (t, H_a, 3H, J = 7.3 Hz), 1.59 (s, H_c, 6H), 4.17 (q, H_d, 2H, J = 6.8 Hz), 4.58 (q, H_b, 2H, J = 7.3 Hz). ^{13}C NMR: δ 13.4, 14.1 (C_a, C_h), 25.8 (C_d), 54.2 (C_b), 61.7 (C_e), 69.7 (C_g), 173.0 (C_f), 211.0 (C_c).

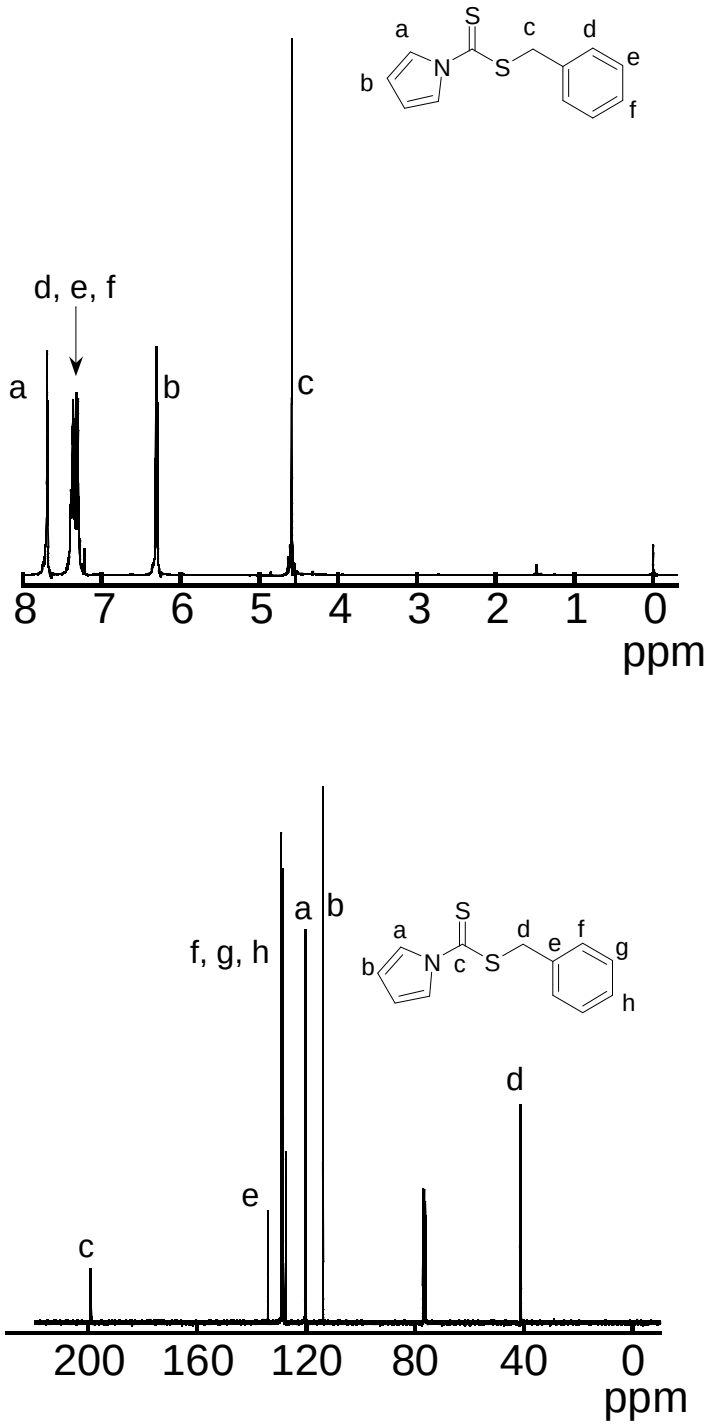

Figure S6. ^{1}H and ^{13}C NMR spectra of CTA 6 (400 MHz, $CDCl_3$). ^{1}H NMR: δ 4.60 (s, H_c, 2H), 6.31 (m, H_b, 2H), 7.33 (m, H_d, H_e, H_f, 5H), 7.70 (m, H_a, 2H). ^{13}C NMR: δ 41.7 (C_d), 114.1 (C_b), 120.5 (C_a), 127.8, 128.7, 129.3 (C_f, C_g, C_h), 134.4 (C_e), 199.3 (C_c).

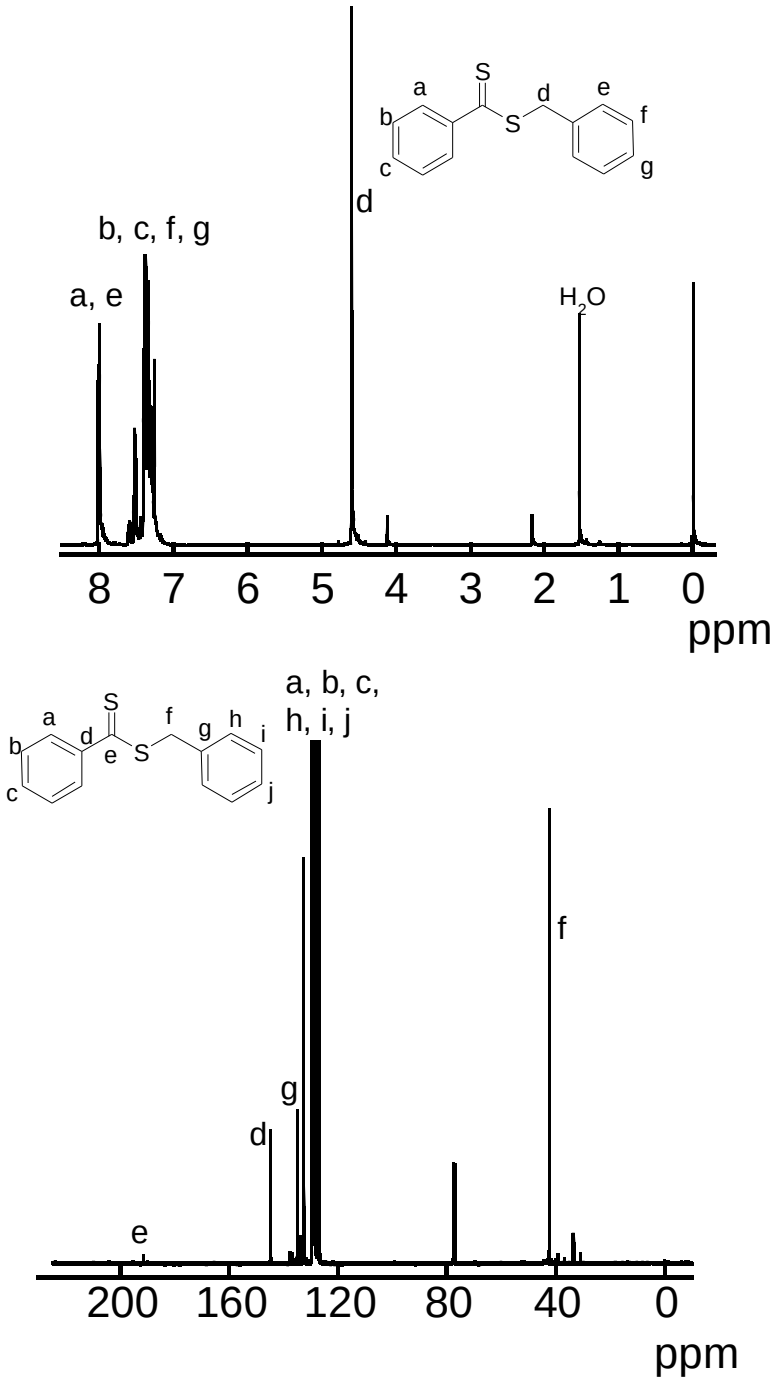

Figure S7. ^{1}H and ^{13}C NMR spectra of CTA 7 (400 MHz, $CDCl_3$). ^{1}H NMR: δ 4.60 (s, H_d, 2H), 7.30-7.60 (m, H_b, H_c, H_f, H_g, 8H). 7.96-8.01 (m, H_a, H_e, 4H) ^{13}C NMR: δ 42.0 (C_f), 126.8, 127.7, 128.3, 128.7, 129.2, 132.3 (C_a, C_b, C_c, C_h, C_i , C_j), 134.9 (C_g), 144.7 (C_d), 227.7 (C_e).

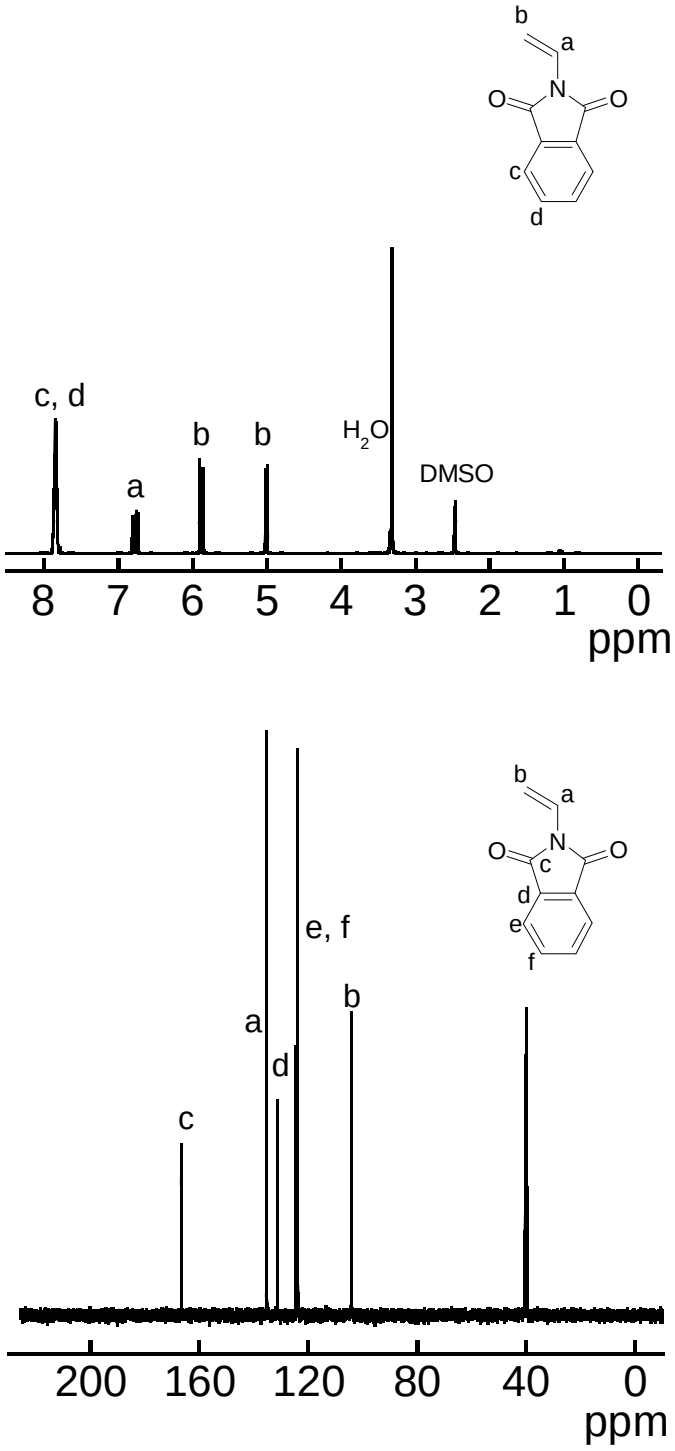

Figure S8. ^{1}H and ^{13}C NMR spectra of NVPI (400 MHz, *d*-DMSO). ^{1}H NMR: δ 5.00 (d, H_b, 1H, J = 10.1 Hz), 5.94 (d, H_b, 1H, J = 10.2 Hz), 6.77 (q, H_a, 1H, J = 6.4 Hz), 7.8-7.9 (m, H_c, H_d, 4H). ^{13}C NMR: δ 104.2 (C_b), 123.9, 124.6 (C_e, C_f), 131.6 (C_d), 135.4 (C_a), 166.7 (C_c).

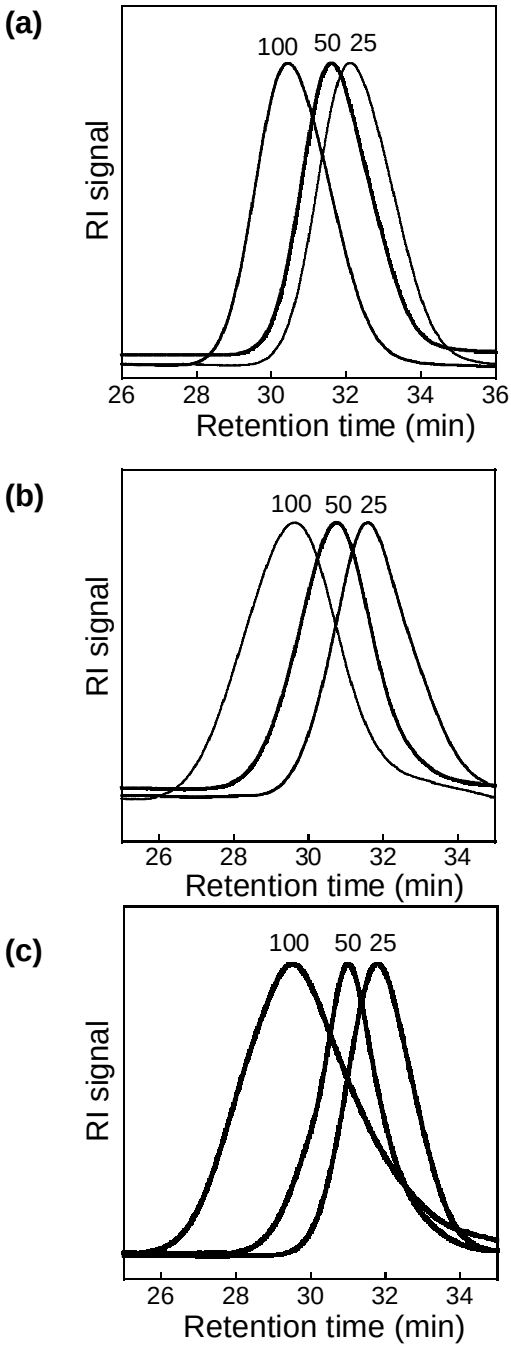

Figure S9. SEC traces of poly(NVPI)s obtained at different $[M]_0/[CTAs]_0$ ratios. (a) CTA 4, (b) CTA 5, (c) CTA 6. See Table 4 for detailed conditions and results.

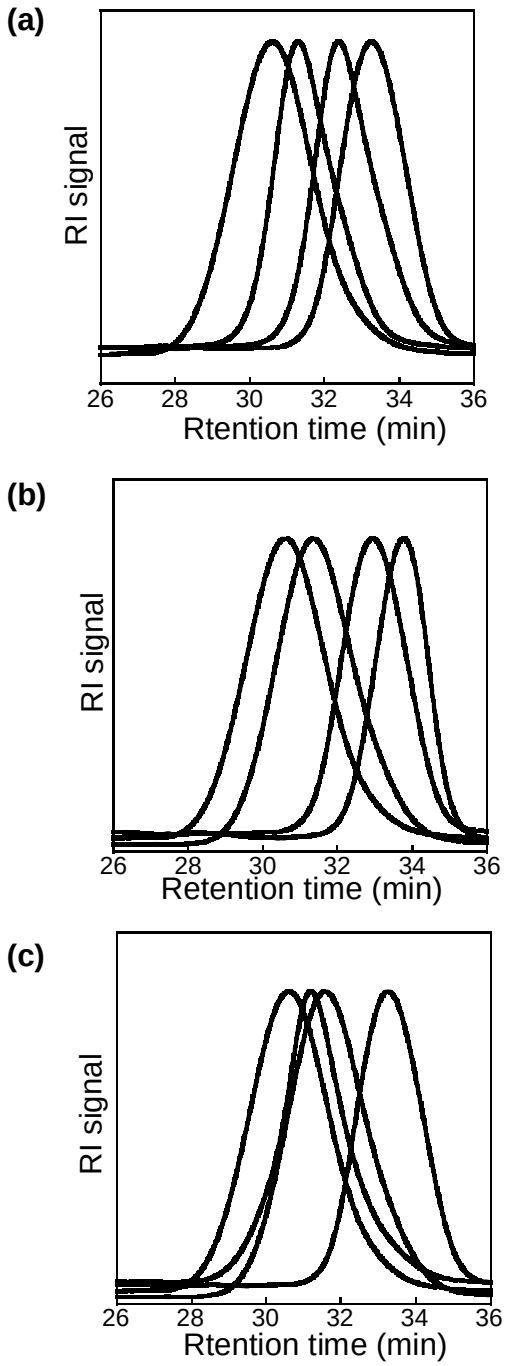

Figure S10. Evolution of SEC traces with polymer yield: (a) $[CTA\ 4]_0/[AIBN]_0 = 2$, (b) $[CTA\ 5]_0/[AIBN]_0 = 2$, and (c) $[CTA\ 5]_0/[AIBN]_0 = 2$. See Figure 1 for detailed conditions.