Supporting information

Synthesis and Identification of Polystyrene via Conventional and Controlled Radical Polymerization Methods: Effect of Temperature, Initiator and Transfer Agent on Molecular Weight and Reaction Rate

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Polystyrene standards (9 samples) with narrow molecular weight distributions and molecular weights in the range of about 10^3-3×10^6 $gmol^{-1}$ were used to obtained calibration curve. Then, for each sample according to the elution volume of sample and column calibration, diagram of the molecular weight of the sample was obtained.

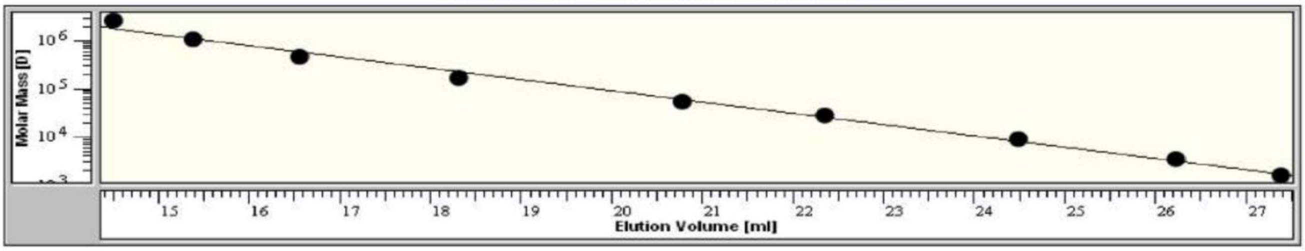

Figure S1. Molecular weight calibration curve in terms of elution volume

In the FRP, polymerization rate is dependent on the lumped kinetic parameter (i.e. $k_p k_t^{-0.5}$) via the following equation [38].

$$\ln\frac{[M]_0}{[M]} = 2k_p\left(\frac{f[AIBN]_0}{k_d k_t}\right)^{0.5}\left(1-\exp(-k_d t/2)\right) \quad (S1)$$

in which t, k_p and k_t are the reaction time, average propagation and termination rate constants of the polymerization, respectively. In the RITP reaction, however, there is an inhibition time to be considered in the Eq. (S1). Then, Eq. (S1) can be rewritten as Eq. (S2).

$$\ln\frac{[M]_0}{[M]} = 2k_p\left(\frac{f[AIBN]_{t,inh}}{k_d k_t}\right)^{0.5}\left(1-\exp(-k_d \tau/2)\right) \quad (S2)$$

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$$[AIBN]_{\mathrm{t,inh}} = [AIBN]_0 \exp\left(-k_{\mathrm{d}} t_{\mathrm{inh}}\right) \tag{S3}$$

in which $[\mathrm{AIBN}]_{\mathrm{t,inh}}$ indicates concentration of the AIBN at the end of the inhibition period and τ is the reduced reaction time ($\tau = t - t_{\mathrm{inh}}$) which indicates a time elapsed after inhibition time.