Supplementary Information

Straightforward Synthesis of Model Polystyrene-block-Poly(vinyl alcohol) Diblock Polymers

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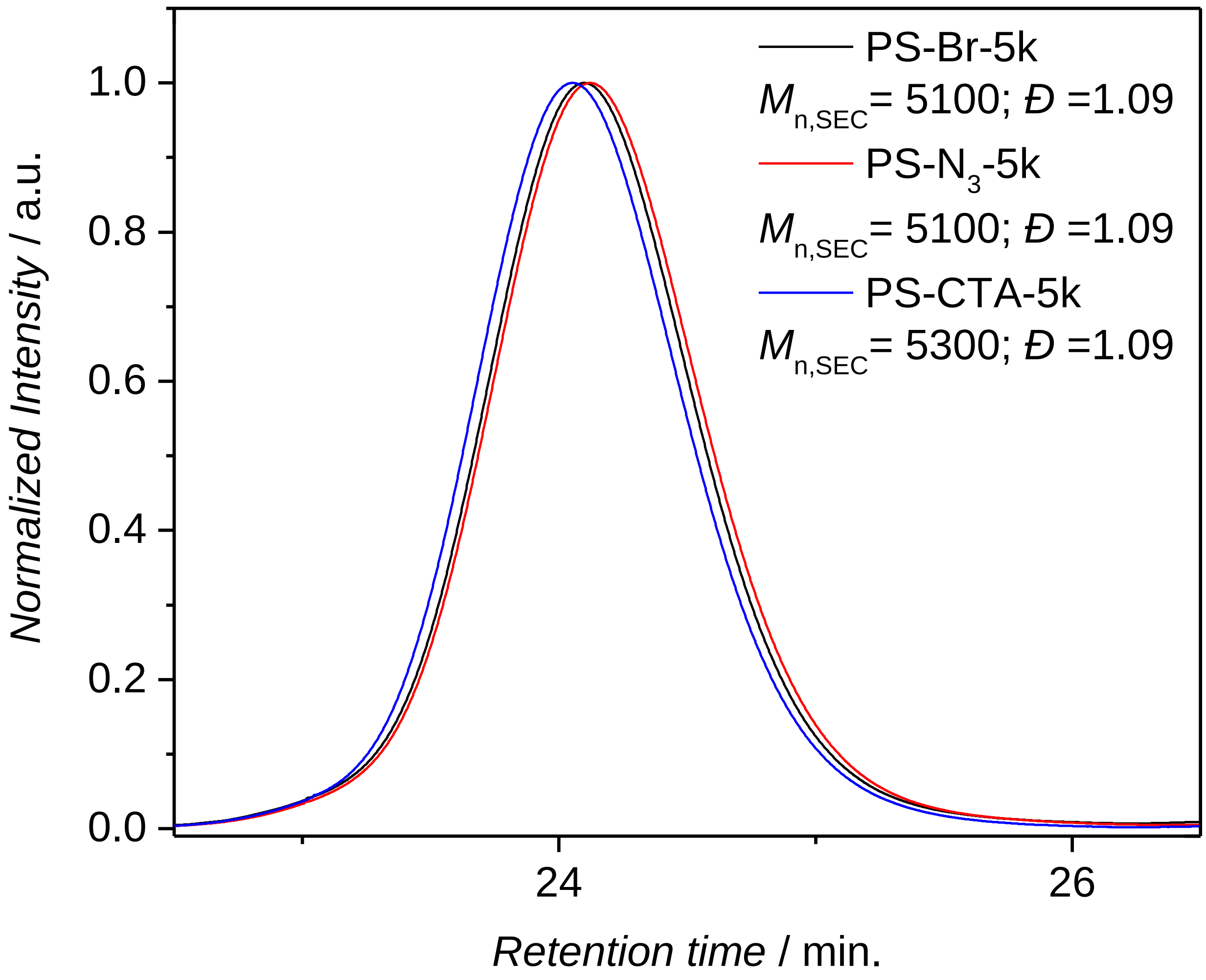

Figure S1. SEC traces of the precursor polymers (PS-Br-5k, PS-N_3-5k, PS-CTA-5k) using $CHCl_3$ as the eluent and calibrated with polystyrene standards.

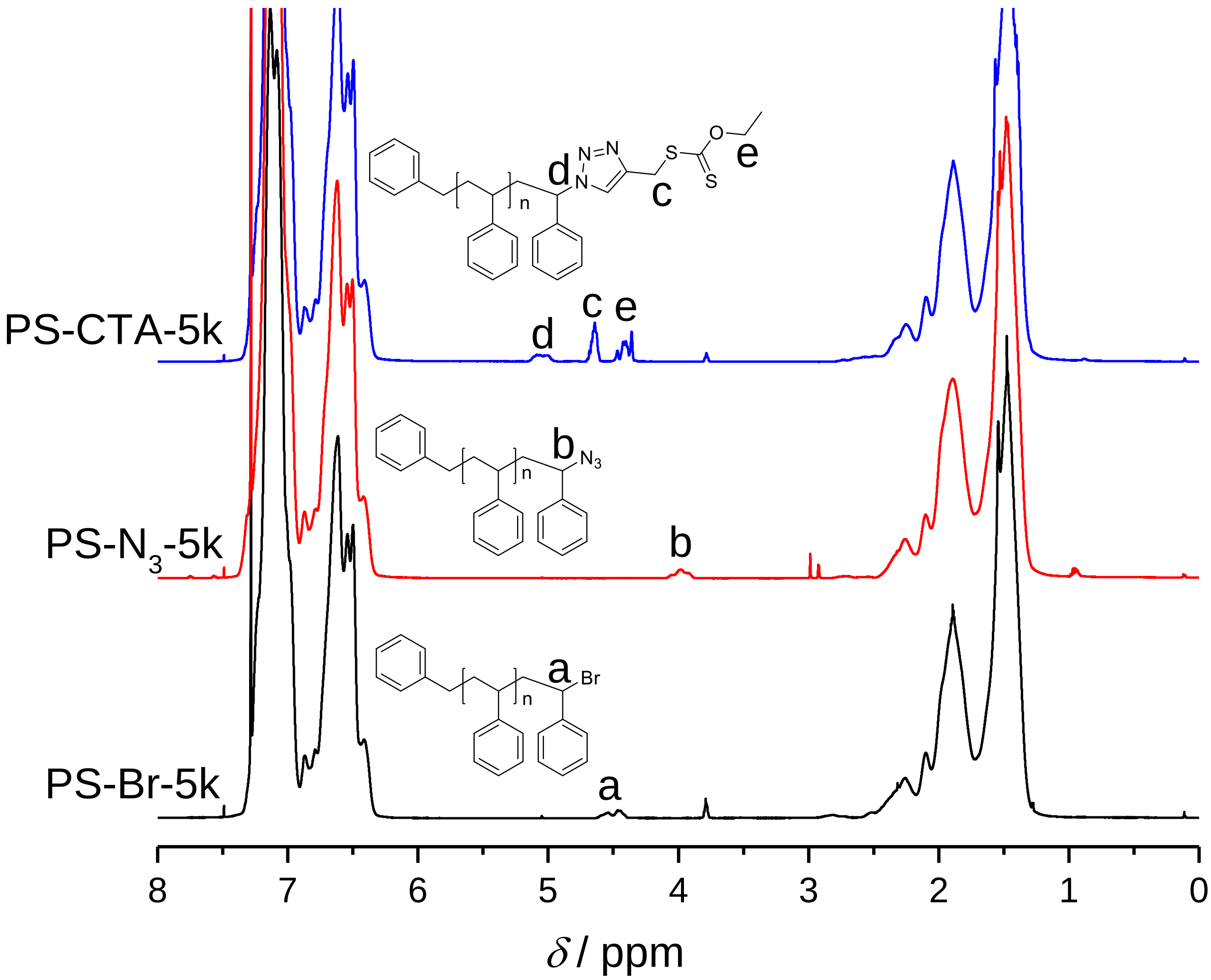

Figure S2. ^{1}H NMR spectra of the precursor polymers (PS-Br-5k, PS-N$_3$-5k, PS-CTA-5k) in CDCl$_3$ at the ambient temperature.

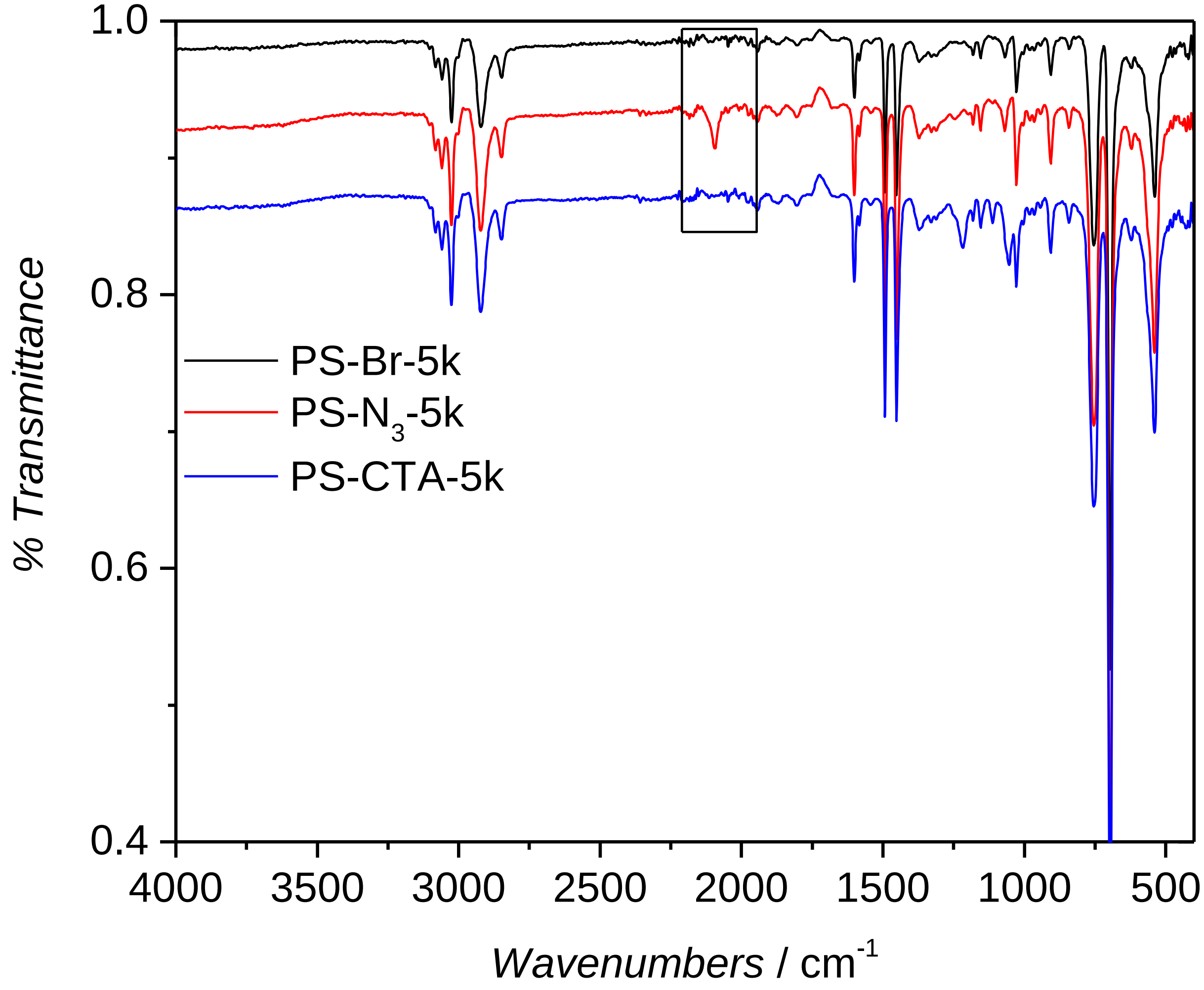

Figure S3. FT-IR spectra of the precursor polymers (PS-Br-5k, PS-N_3-5k, PS-CTA-5k).

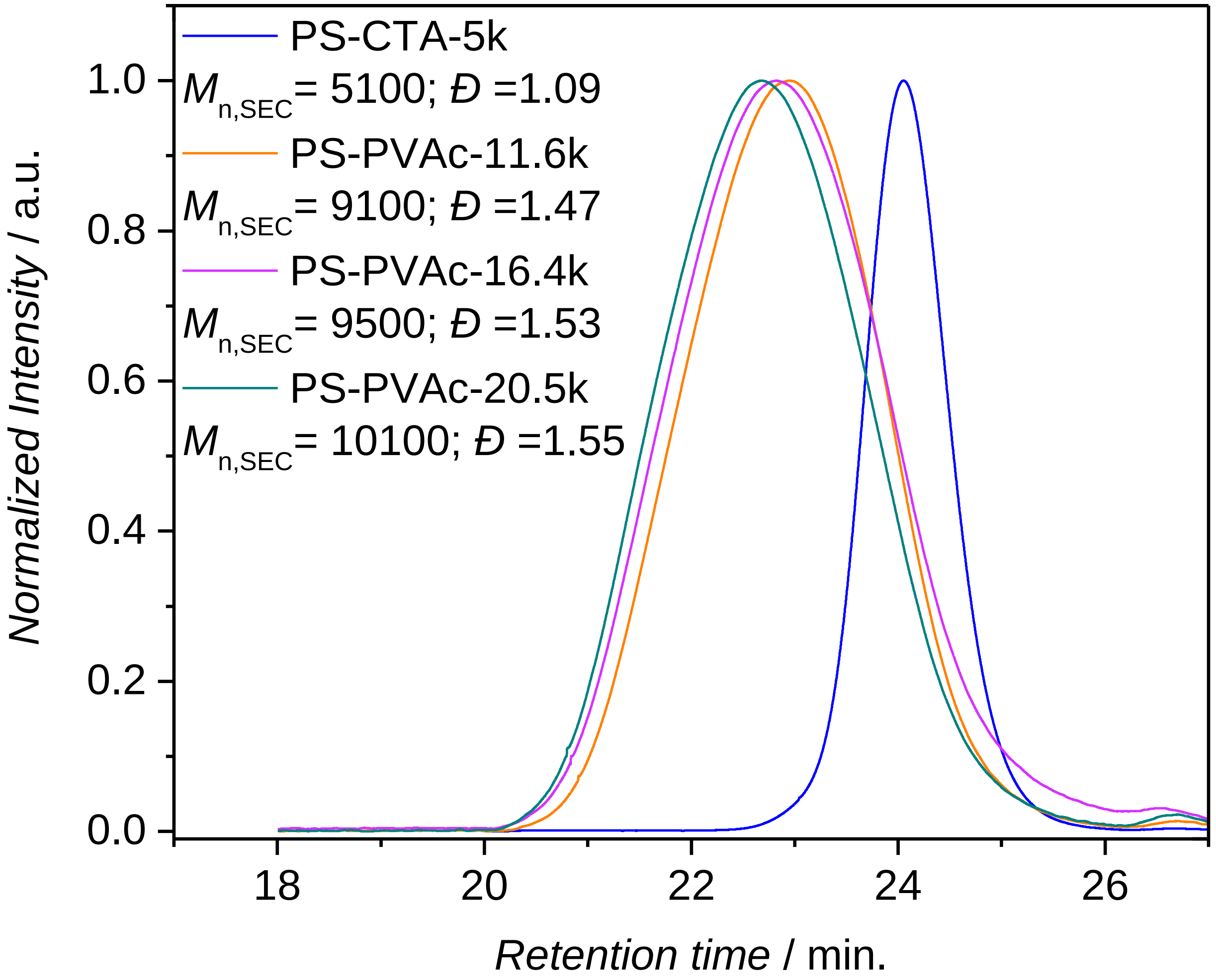

Figure S4. SEC traces of diblock block polymers (PS-PVAc-11.6k, PS-PVAc-16.4k, PS-PVAc-20.5k) and the precursor polymer (PS-CTA-5k) using $CHCl_3$ as the eluent and calibrated with polystyrene standards.

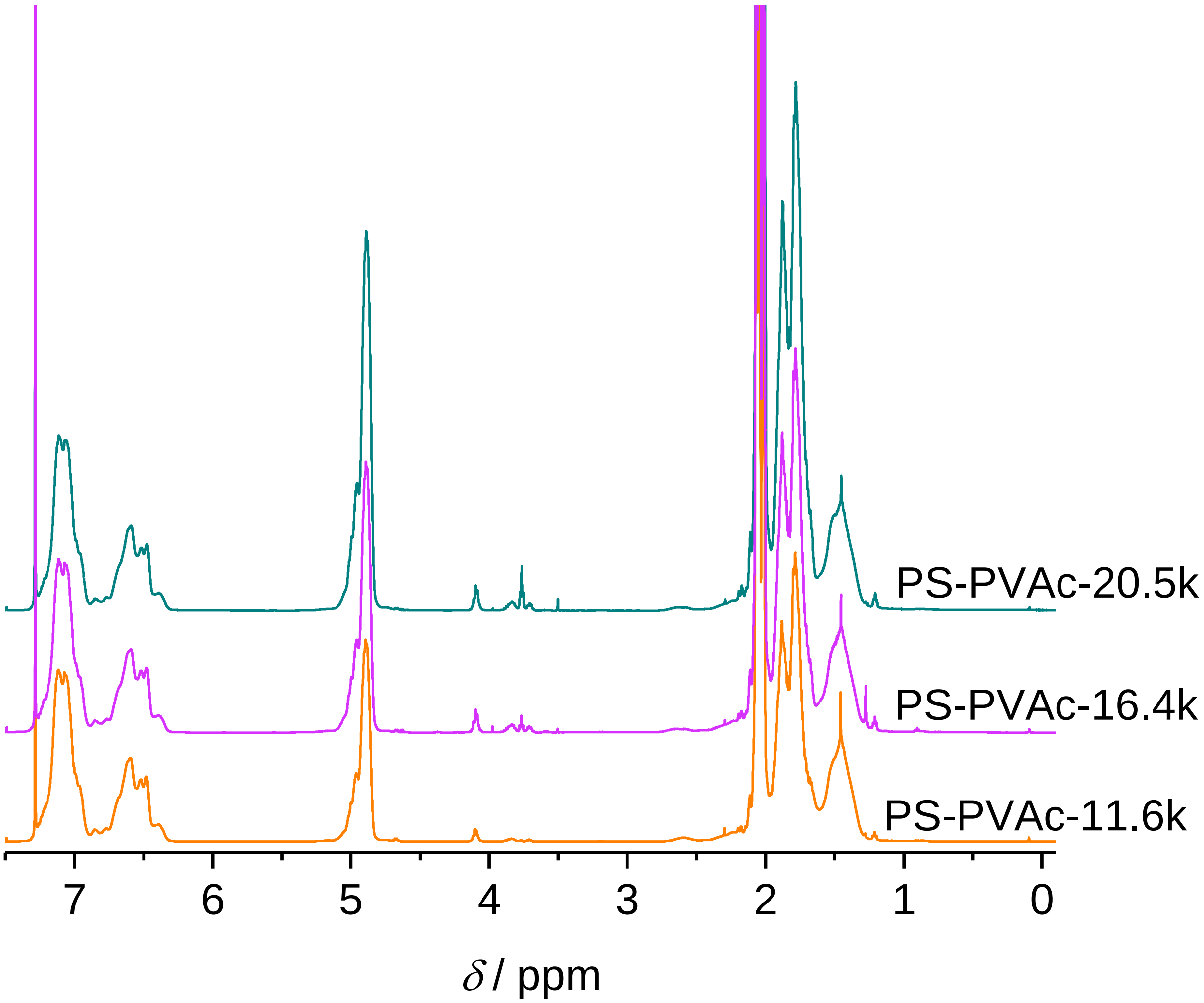

Figure S5. ^{1}H NMR spectra of diblock block polymers (PS-PVAc-11.6k, PS-PVAc-16.4k, PS-PVAc-20.5k) in $CDCl_3$ at the ambient temperature.

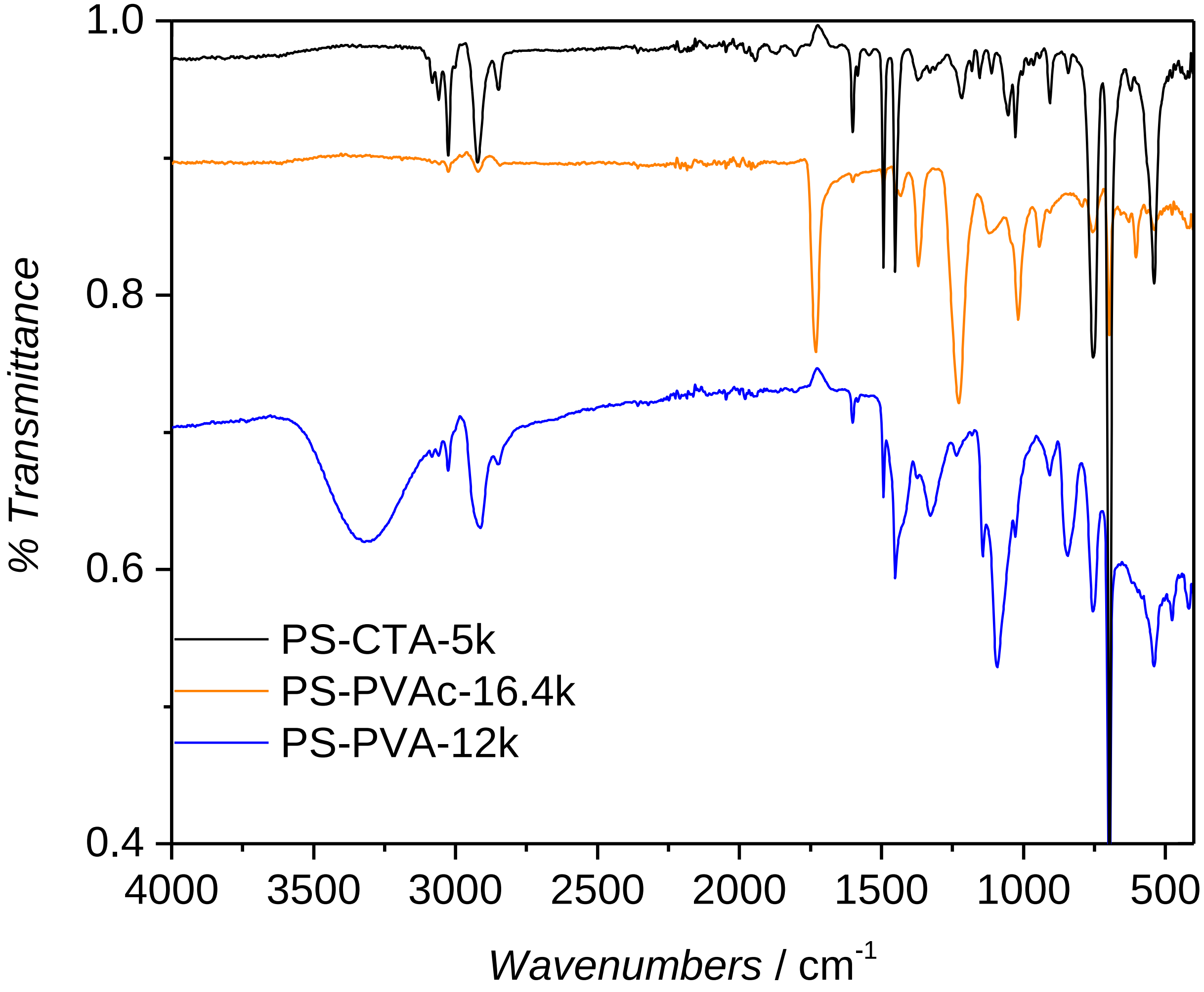

Figure S6. FT-IR spectra of the diblock block polymers (PS-PVA-12k and PS-PVAc-16.4k) and the precursor polymer (PS-CTA-5k).

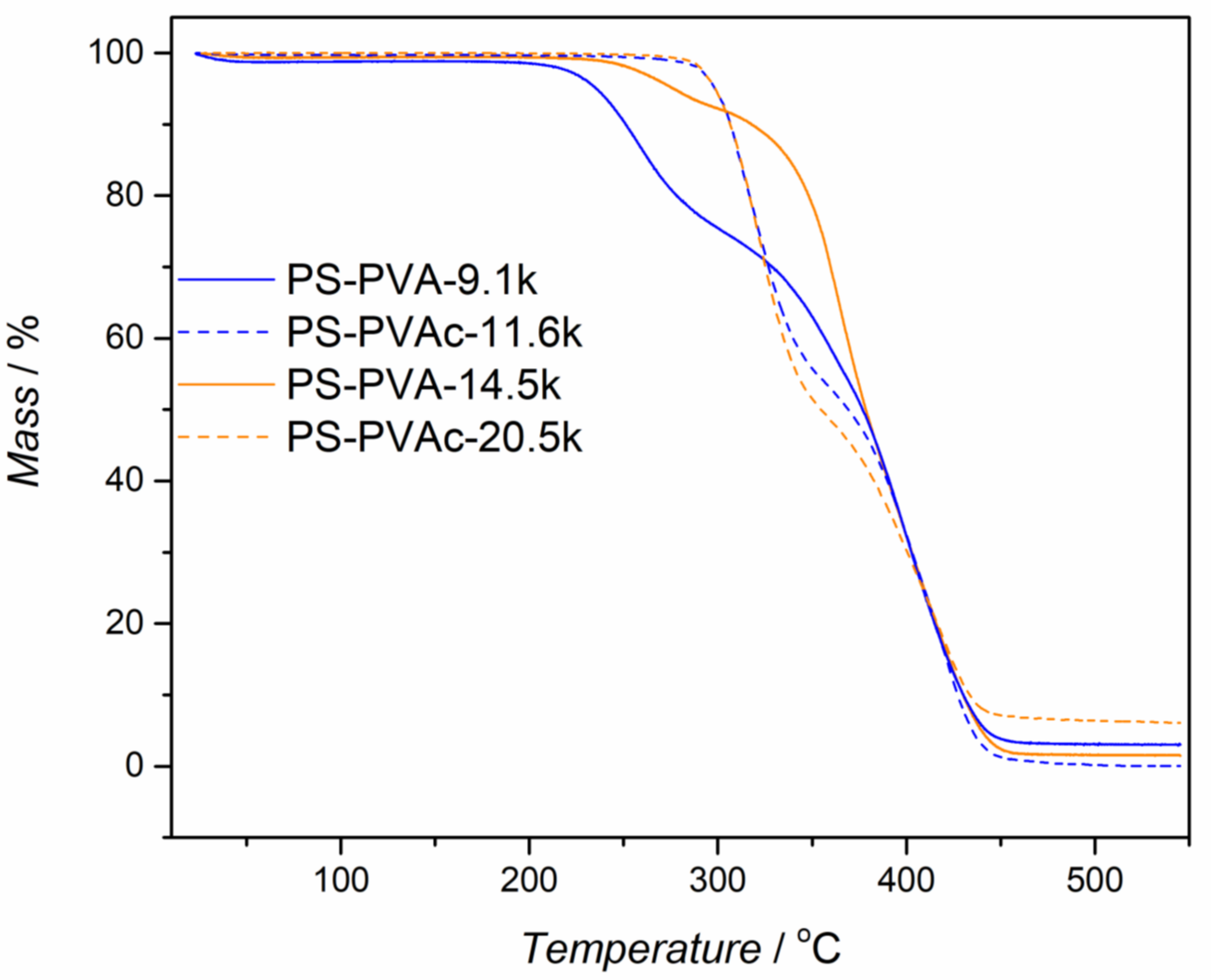

Figure S7. Thermogravimetric overlay of the diblock polymer and corresponding precursor diblock polymer heated at a rate of 10 °C·min^{-1} under nitrogen atmosphere.

Atomic force microscopy (AFM) was utilized to investigate the surface structures of spin coated PS-PVA films. As a representative sample, the thin film assembly of the PS-PVA-12k block polymer was examined. A solution of the PS-PVA-12k block polymer was prepared with concentration of 25 mg·mL^{-1} in dimethylacetamide at 85 °C. Thin films of the PS-PVA-12k sample were prepared on a silicon wafer with a native oxide layer by spin-coating from the hot solution. The thickness of the polymer film was around 35 nm as estimated by ellipsometry.

After keeping the sample at 230 °C for 1 min under nitrogen atmosphere above the melting temperatures of the PVA chains, the thin film was annealed under nitrogen atmosphere at 180 °C for 16 h above the recrystallization temperatures of the PVA chains (Figure S8). The AFM images of a 1 μm × 1 μm scan area of the substrate coated with the PS-PVA-12k block polymer do not reveal clear morphology patterns (Figure S9).

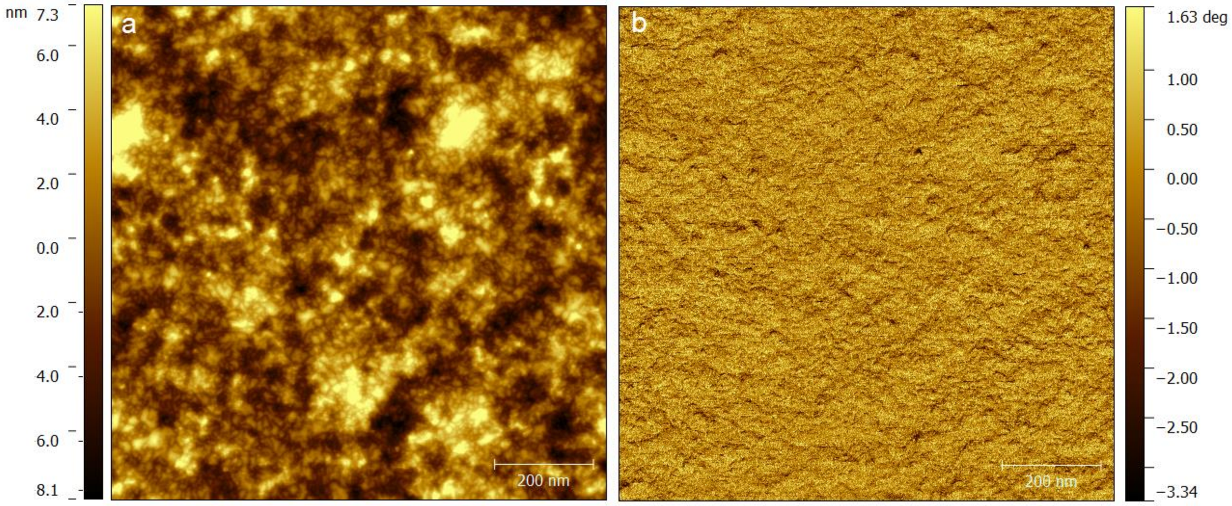

Figure S8. AFM height (a) and phase (b) images obtained in tapping mode of PS-PVA-12k, T_o = 34 nm, thin film using Bruker’s Peak Force tapping mode. T_o is the thickness as measured by ellipsometer. The thin film on the bare silicon wafer was melted at 230 °C for 1 min and then annealed at 180 °C for 16 h.

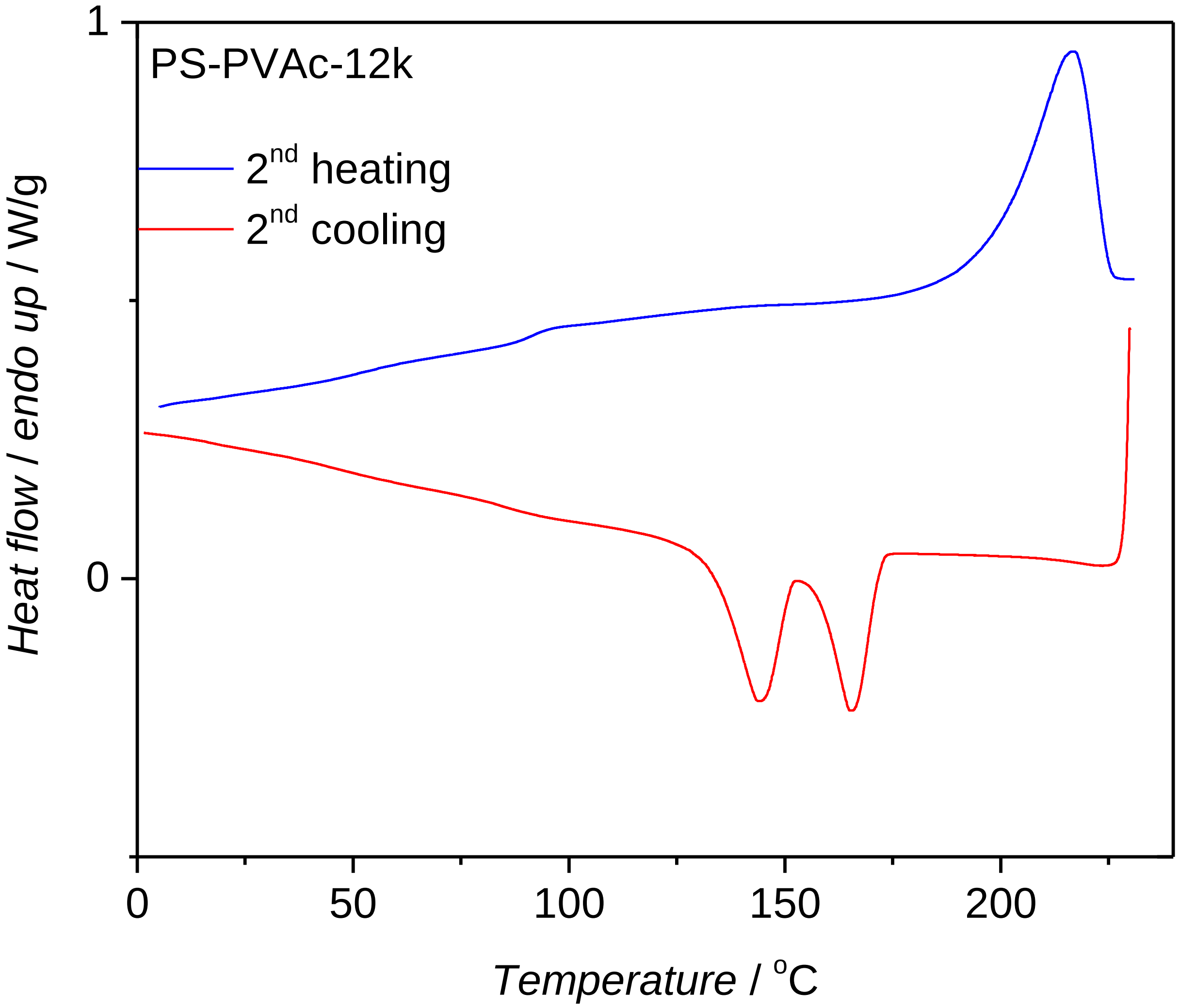

Figure S9. DSC thermograms for PS-*b*-PVA block polymer (PS-PVA-12k). Each thermal scan was taken at a rate of 10 °C·min^{-1} upon a second heating as well as cooling.