

Supporting Information

Non-equilibrium Phase Behavior of Immiscible Polymer-Grafted Nanoparticle Blends

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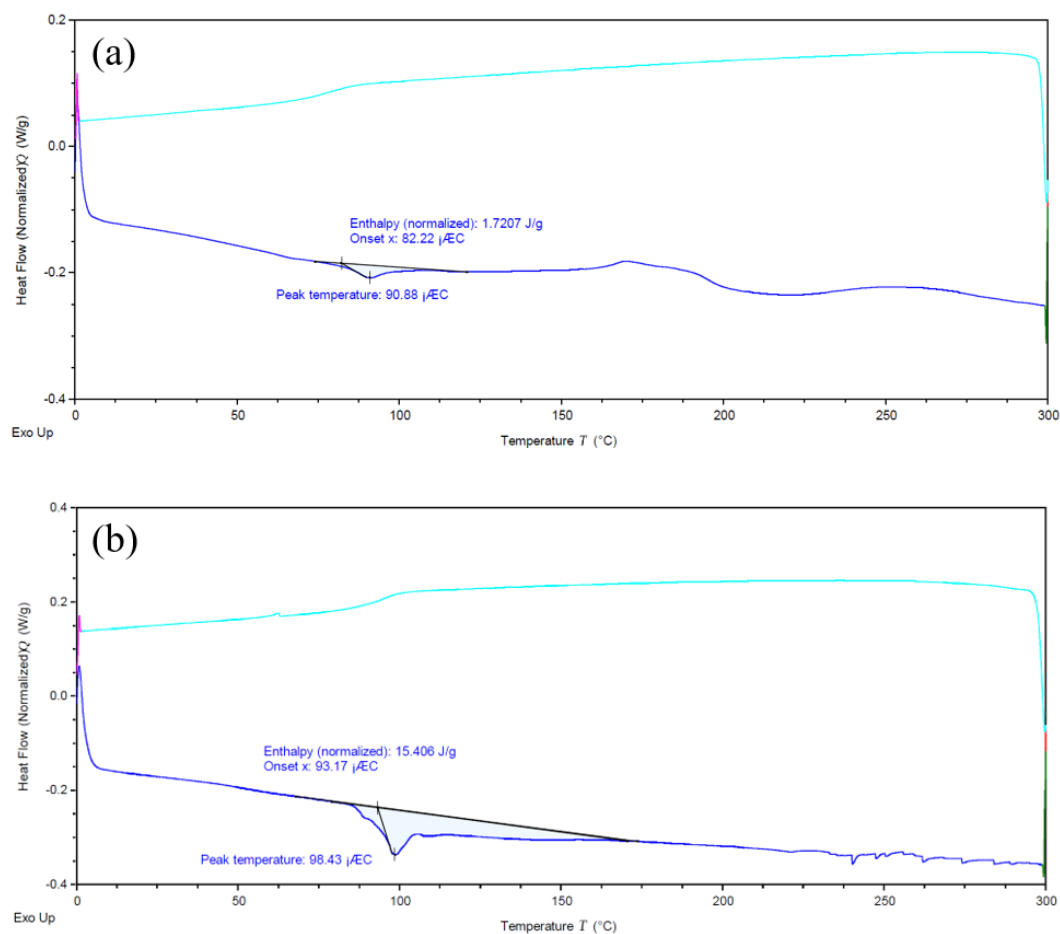


Figure S1. Differential scanning calorimetry (DSC) curves of (a) dPS3k-SiO₂ and (b) dPS24k-SiO₂.

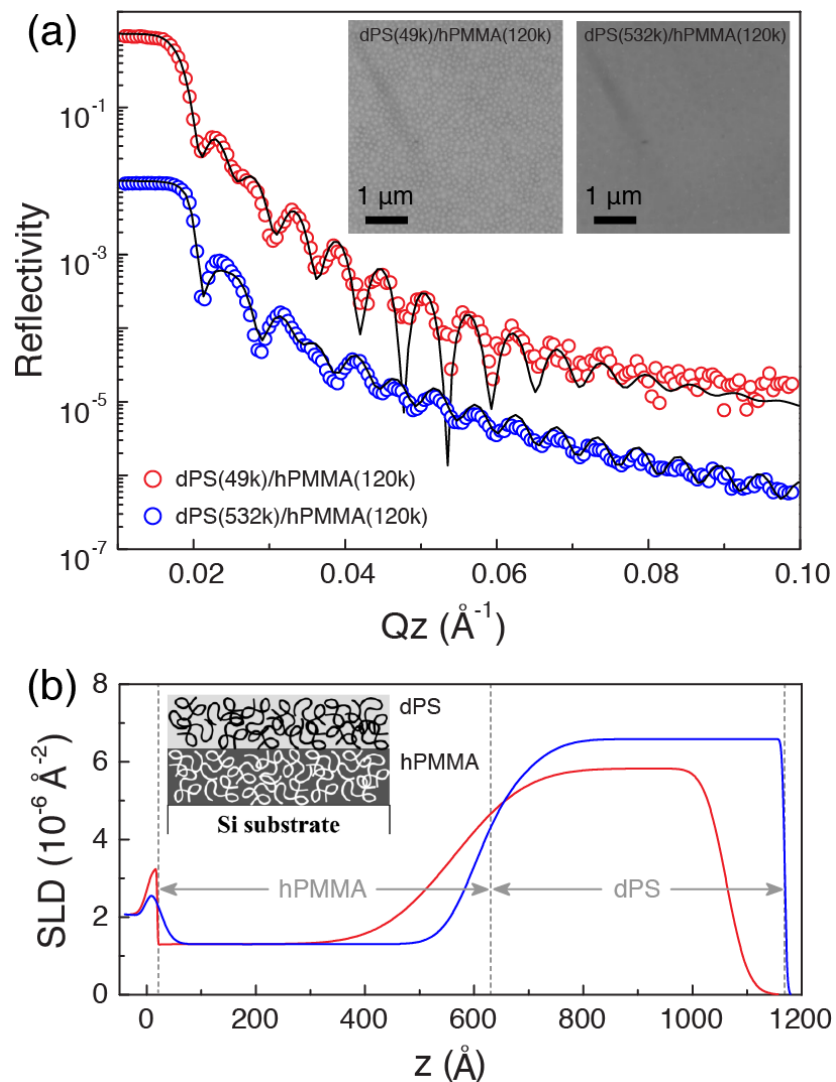


Figure S2. (a) NR profiles (best fitting in solid black lines) of the PMMA120k/dPS49k (red circles) and PMMA120k/dPS532k (blue circles) blend films and (b) their corresponding SLD profiles. Inset (b) denotes a formation of bilayer structure where broader interface between dPS and hPMMA domains is observed for low M (dPS49; red solid line) blend compared to high M (dPS532k; blue solid line). Insets (a) depict the optical images of the corresponding blend films spin-coated onto Si substrate.

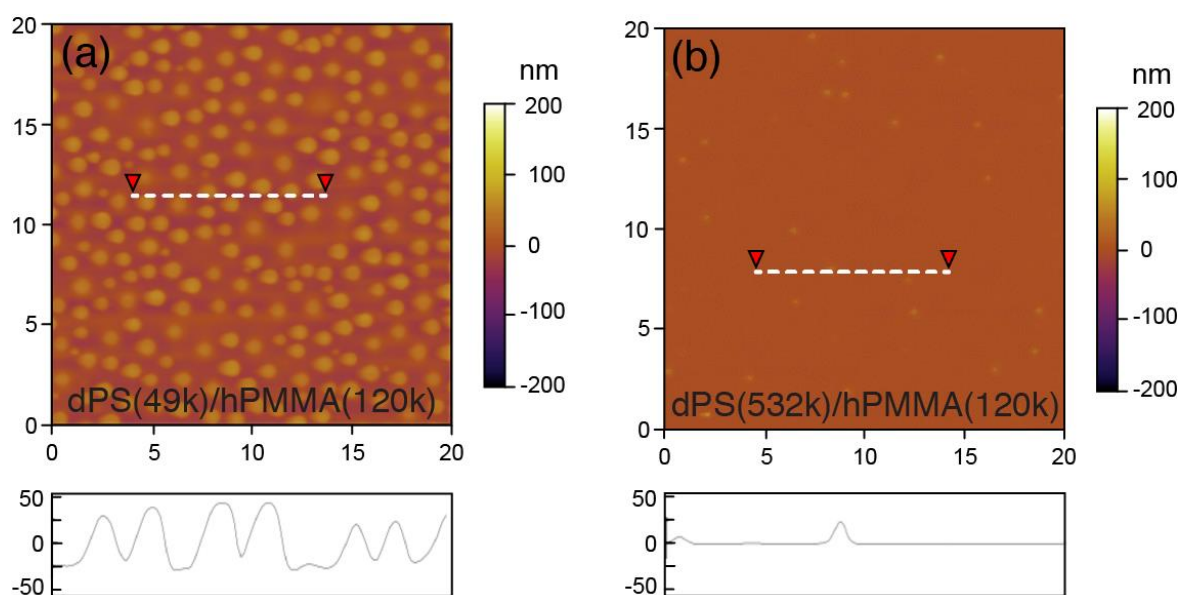


Figure S3. AFM height images of the as-cast (a) PMMA120k/dPS49k and (b) PMMA120k/dPS532k blend films. Line scan of height images depicts a formation of droplets with amplitude ~ 50 nm on the surface of low M (dPS49k) sample. White dashed lines indicate position used for line scans.

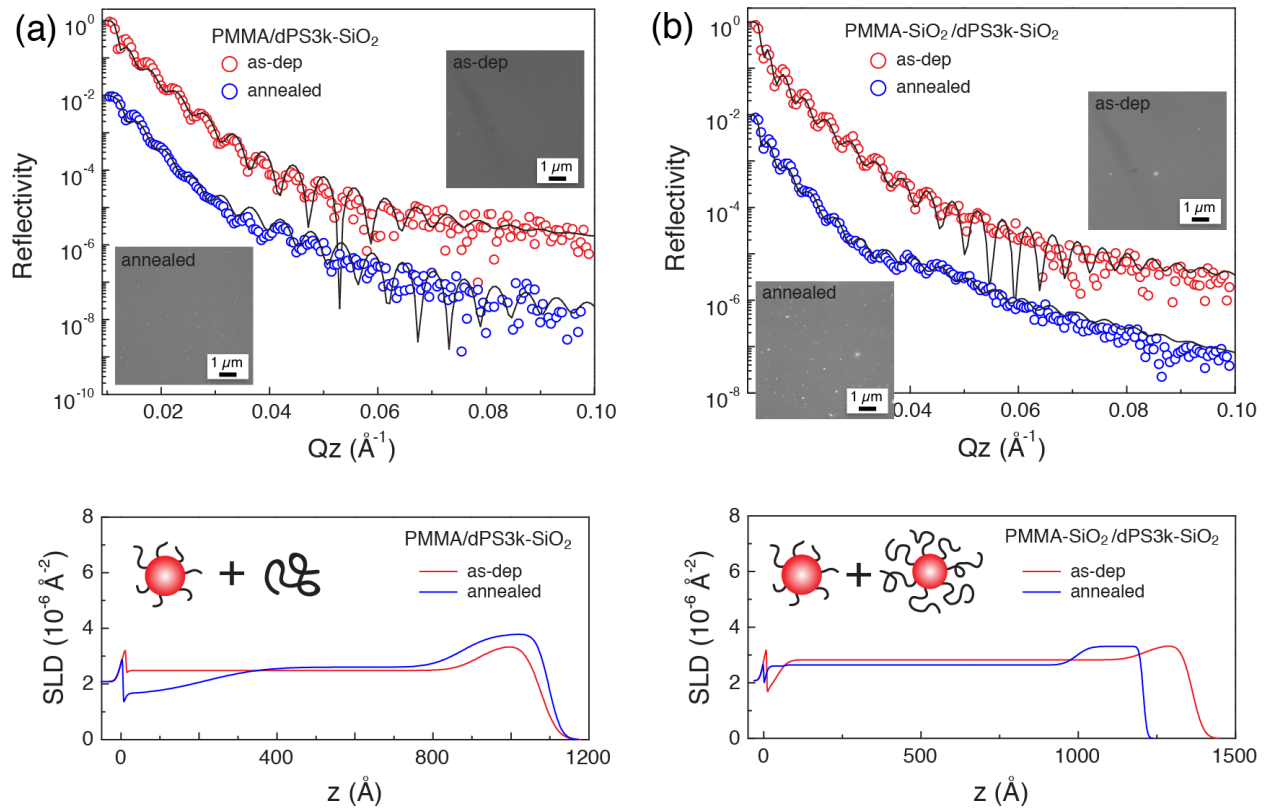


Figure S4. NR profiles and the corresponding SLD profiles of (a) PMMA120k/dPS3k-SiO₂ and (b) PMMA-SiO₂/dPS3k-SiO₂ blend films after thermal annealing for 0 and 24 hours at $T = 180$ °C. Insets denote the respective optical images.

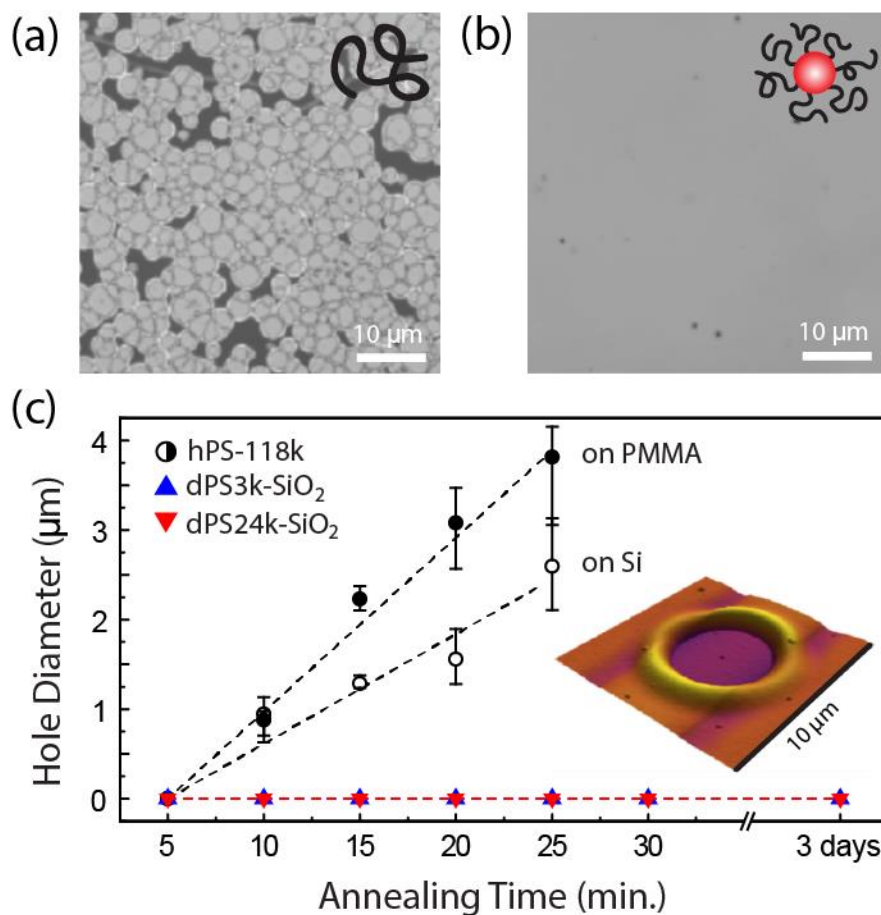


Figure S5. Optical images of (a) linear PS (118 kDa) and (b) dPS24k-SiO₂ thin films (~ 100 nm) floated onto PMMA (120 kDa) coated Si substrate after thermal annealing at $T = 180$ °C for (a) 25 min and (b) 3 days, respectively. (c) Dewetting hole diameter of the linear PS thin film on PMMA (closed circle) and Si substrate (open circles), and dPS-SiO₂ thin films with $M = 3$ kDa

(blue triangles) and 24 kDa (red inverted triangles) on PMMA at varying annealing duration (5 min ~ 3 days, $T = 180^{\circ}\text{C}$). Dashed lines are to guide the eye. Inset shows the AFM 3D scan image of a typical dewetting hole ($t = 25$ min) of PS/PMMA bilayer films.

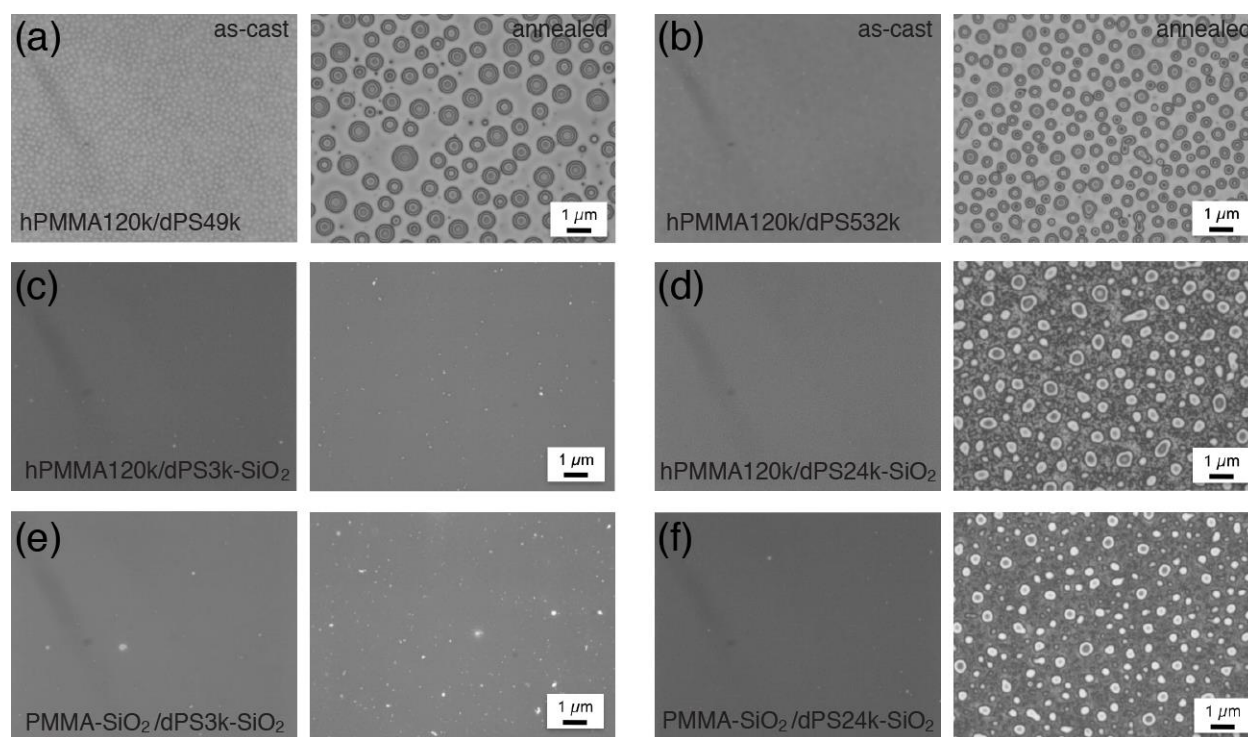


Figure S6. Optical images of blend films for (a) PMMA120k/dPS49k, (b) PMMA120k/dPS532k, (c) PMMA120k/dPS3k-SiO₂, (d), PMMA120k/dPS24k-SiO₂, (e) PMMA-SiO₂/dPS3k-SiO₂, (f) PMMA-SiO₂/dPS24k-SiO₂ after thermal annealing for 0 and 24

hours at 180°C. Blend films containing dPS3k-SiO₂ are found to be thermally stable compared to the other blends.

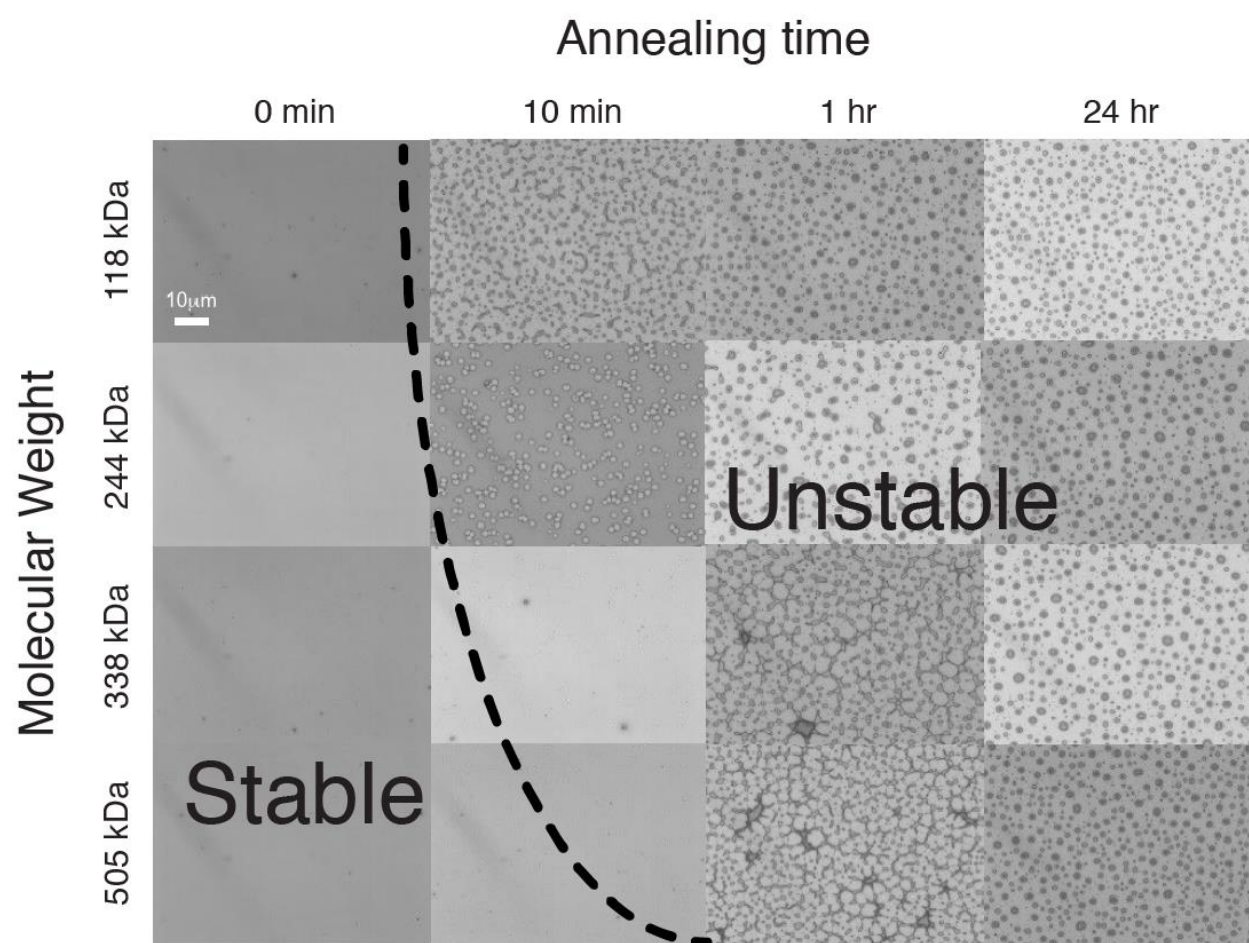


Figure S7. Optical images of PS(M^{PS})/PMMA($M^{\text{PMMA}} = 120$ kDa) blend films with various PS molecular weight ($M^{\text{PS}} = 118, 244, 338, 505$ kDa) after thermal annealing for 0-24 hours at 180°C. Morphological evolution is observed depending on the molecular weight after thermal annealing where wetting and dewetting regions were indicated by dashed line.