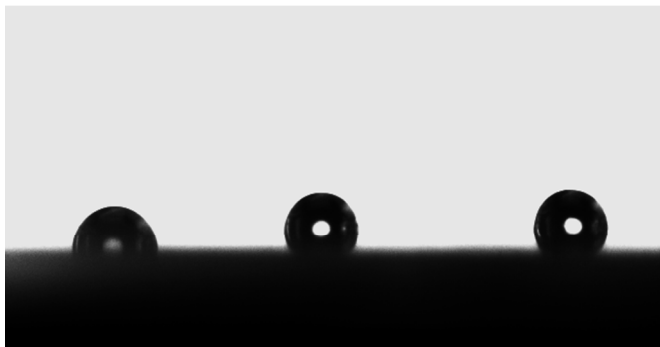# Supporting Information

Capillary Imbibition of Polymer Mixtures in Nanopores

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Figure S1 and Video of spreading of three droplets corresponding to the homopolymers (PEO 50k: left, PEO 500k: right) and their symmetric mixture (middle) on a flat alumina surface at 85 $^{\circ}$C

Dynamic contact angle

The effect of employing the dynamic contact angle (DCA), θ_d, instead of the equilibrium one (ECA), θ_e, was examined. It is known that DCA depends on the velocity of the three-phase contact line, v, results in a modification to the LWE. The exact form of the $\theta(v)$ dependence is still a point of debate,[1-3] however, the thermodynamic theory proposed by Cox[4] has shown good agreement with experiment. The theory emphasizes the viscous energy dissipation in the bulk and removes the singularities at the triple line by employing a microscopic slip boundary length, δ, according to:

$$\theta_d = \left(\theta_e^3 + 9A\frac{\eta}{\gamma}v\right)^{1/3} \tag{S1}$$

where $A=\ln(R/\delta)$, θ is expressed in radian and v in m/s. The effect of employing the DCA instead of the ECA in the LWE is tested in **Figure S2** for three different PEO homopolymers, by assuming $v=dH/dt$. Since $\theta_e > \theta_d$, the modified LWE invariably predicts a smaller capillary rise. Differences from the usual LWE are minor, hence DCAs, cannot account for the experimental observations in lower and higher molecular weight samples.
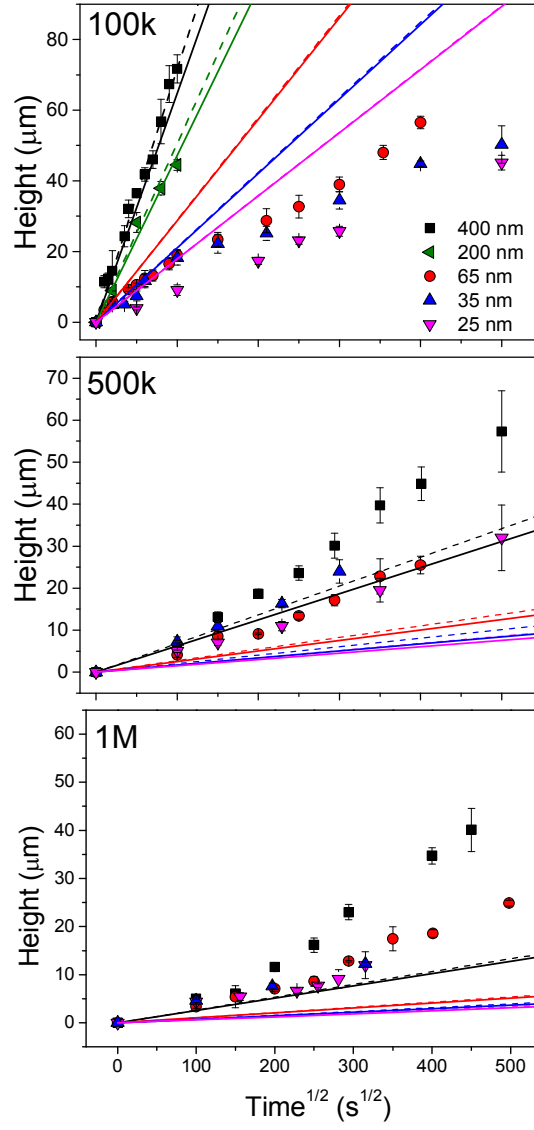
Figure S2. Imbibition length *h*, as a function of $t^{1/2}$ for (top) **PEO 100k**, (middle) **PEO 500k** and (bottom) **PEO 1M** within self-ordered AAOs with different pore diameters; (squares) 400 nm, (left triangles): 200 nm, (spheres): 65 nm, (up triangles): 35 nm and (down triangles): 25 nm. Dashed and solid lines give the predictions of LWE (Eq. 9) and modified LWE equation (Eq. S1) for the dynamic contact angle.
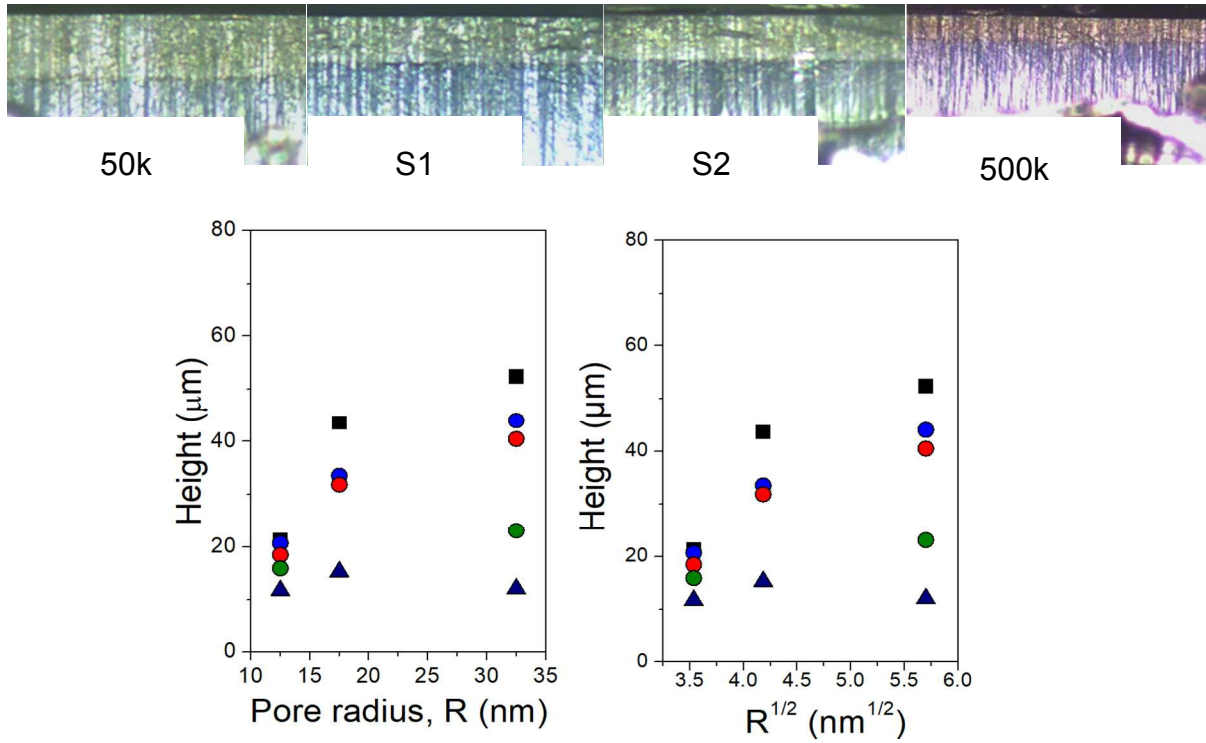
Figure S3. (Top) Reflection microsopy images of PEO 50 k, PEO 500 k and their blends (S1, S2) located inside 35 nm AAO pores obtained at the same imbibition time ($t=200^{1/2}$ $s^{1/2}$). (Bottom) Comparison of imbibition lengths, h, as a function of pore diameter (left) and as a function of the square root of pore diameter (right) for the 50k (squares), 500k (triangles) and their mixtures with compositions: 50/50 (red spheres), 75/25 (blue spheres) and 25/75 (green spheres).

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