

Electronic Supporting Information

ESI.1. Phase transitions

We show density profiles and snapshots with increasing melt length N , for a grafting density of $\sigma_{GD} = 0.27$. The density profile reveals a melt-rich phase at the top of the brush that, for increasing N , grows in concentration at the cost of the concentration of melt in the polymer brush bulk phase. For our definition of mixing and demixing states, we used interpolation of the overlap integrals, as mentioned in the model and methods.

To distinguish between partial and complete wetting, we use visual inspection to assign wetting layers of homogeneous thicknesses to the complete wetting regime, and wetting layers of inhomogeneous thicknesses to the partially wetting regime. It is evident from the melt-rich phase at the top however, that this definition for mixing and demixing phases might be insufficient at accurately categorizing mixing phases and complete wetting phases. The snapshots beside the density profile show mixing, complete wetting and partial wetting points that are close to the wetting transition, where the pictures for $N = 8, 16$ and 32 display behavior that is not visibly clear to determine as either mixing, complete wetting or partially wetting. Around this point, the system can also be considered to be in the complete wetting state.

For example, in the case where $N = 32$, we observe a thin layer of melt wetting the entire brush, yet we find the layer of polymer melt to be thicker locally, which we define as a droplet wetting the brush. Note that this subtlety only arises at the conjunction of the three phases; in general, the distinction between the wetting states is straightforward.

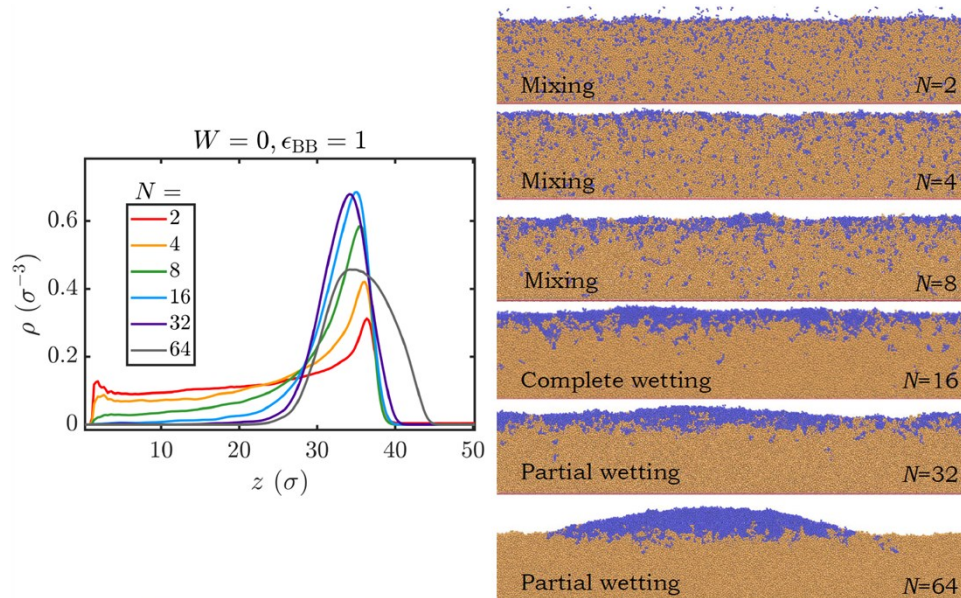


Fig. ES1. Density profiles for brush-melt systems at $\sigma_{GD} = 0.27$, $\epsilon_{BB} = 1.0$ and $W = 0$, for variable N . Pictures next to the density profiles are snapshots of the brush-melt system for increasing N , illustrating the difficulty to clearly define a wetting state for systems that are close to a wetting transition.

ESI.2. Brush swelling

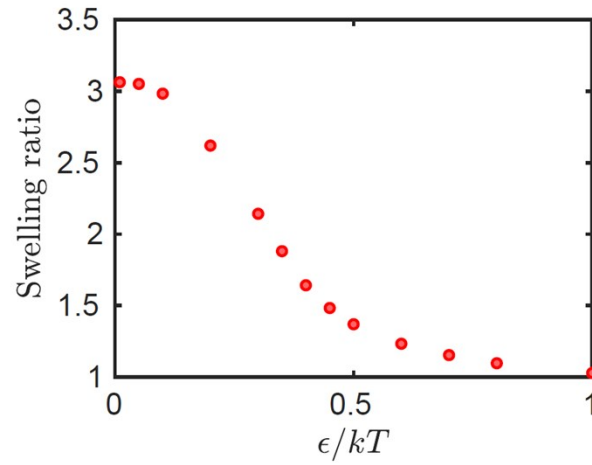


Fig. ES2. A diagram showing the swelling ratio of a polymer brush as a function of the brush-brush attraction ϵ/kT . At the inflection point the brush transitions from an extended brush in good solvent to a collapsed brush in bad solvent.

ESI.3. Surface tensions

We determined the surface tension for the liquid-vapor interface using Irving - Kirkwood analysis on the stress-anisotropy:

$$\Upsilon = \int_0^{L_z} (p_N(z) - p_T(z)) dz$$

where L_z is the system size in z , and p_N and p_T denote the pressure in the normal and tangential directions.

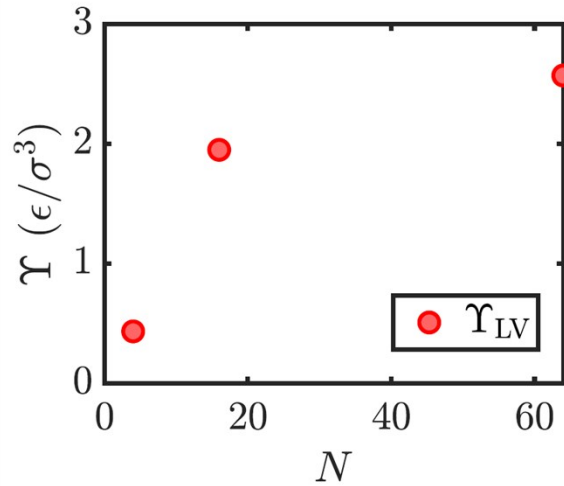


Fig. ES3. Shown are the surface tensions Υ_{LV} for three increasing values of N , as measured according to the Irving-Kirkwood analysis.