# Supplementary Information: Relative stability of the FCC and HCP polymorphs with interacting polymers

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# I. FIGURES IN SUPPLEMENTARY INFORMATION

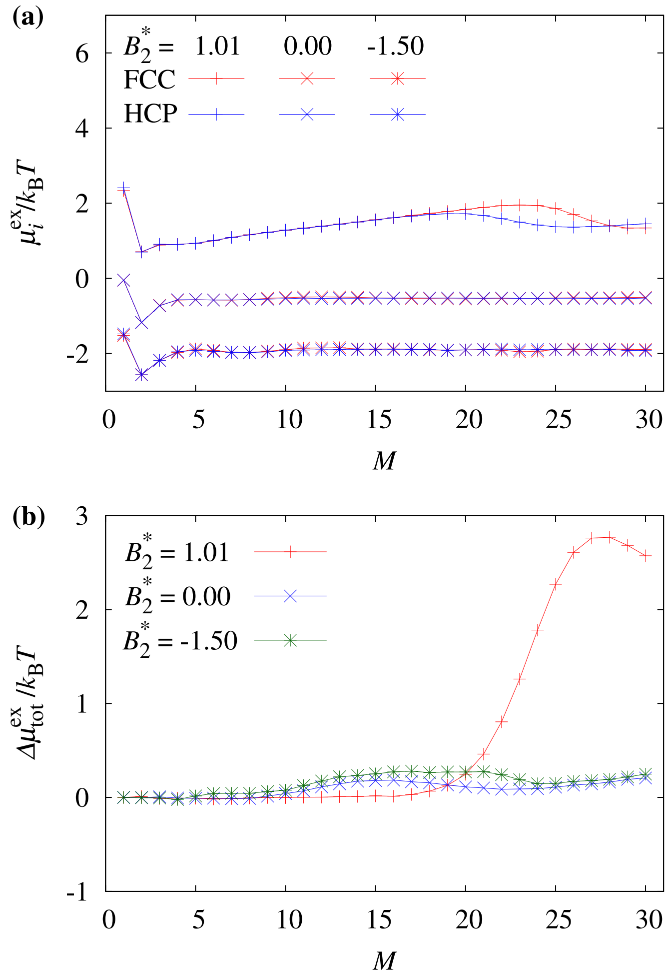


FIG. 1: (a) Incremental chemical potential for an adsorbed polymer of length $M$, where $\sigma_c = 9.50$ at various $B_2^*$ ($\kappa^{-1} = 1/5$ when $B_2^* < 1.01$). Trends are qualitatively the same as for $\sigma_c = 6.45$ presented in main text, but their magnitude for larger $\sigma_c$ is reduced. (b) The difference in total excess chemical potential between the crystal polymorphs for an adsorbed polymer described in (a) as chain length increases. Due to the length of the simulations necessary, uncertainties are higher for larger $\sigma_c$, hence the oscillations when $B_2^* = 0.00$ which appear marginally positive. However, in general at $B_2^* = 0.00$ there is much less, if any, significant polymorphic preference compared to $B_2^* =$ -1.50 which continues to weakly favor the HCP crystal.

## II. TABLES IN SUPPLEMENTARY INFORMATION

TABLE I: Slopes of the total mean-field polymer chemical potential versus chain length for various colloid-monomer interaction potentials. The Yukawa form is used between the colloids and monomers for two different $B_2^*$ values and compared across different colloid diameters, $\sigma_\mathrm{c}$, and interaction decay lengths, $\kappa^{-1}$. The incremental chemical potential of the polymer at each $M$ is averaged between the FCC and HCP polymorphs and summed to give the mean-field total excess chemical potential, $\langle\mu_\mathrm{tot}^\mathrm{ex}\rangle$. This reaches a linear regime in terms of $M$ rather quickly and its slope is reported by averaging its constituent terms over $M \lesssim 30$ for all $\sigma_\mathrm{c}$, excluding $M < 4$, $M < 7$, and $M < 9$ for $\sigma_\mathrm{c} = 6.45$, 8.00, and $\sigma_\mathrm{c} \geq 9.50$, respectively. One standard deviation is reported as the error in each case. The parameter $a$ is defined in the terms of the mean-field theory presented in the main text.

| | | $B_2^* = 0.00$ | | | $B_2^* = -0.19$ | | | |
|---|---|---|---|---|---|---|---|---|
| $\sigma_c$ | $\kappa^{-1}$ | $\epsilon$ | $\mathrm{d}\langle\mu_\mathrm{tot}^\mathrm{ex}/k_\mathrm{B}T\rangle/\mathrm{d}M$ | $\pm$ | $\epsilon$ | $\mathrm{d}\langle\mu_\mathrm{tot}^\mathrm{ex}/k_\mathrm{B}T\rangle/\mathrm{d}M$ | $\pm$ | $a$ |
| 6.45 | 1/5 | 2.78 | -0.227 | 0.012 | 3.00 | -0.526 | 0.013 | 1.720[a] |
| 8.00 | 1/5 | 3.03 | -0.404 | 0.006 | 3.26 | -0.662 | 0.006 | 1.358 |
| 9.50 | 1/5 | 3.24 | -0.525 | 0.008 | 3.48 | -0.764 | 0.011 | 1.258 |
| 11.00 | 1/5 | 3.43 | -0.551 | 0.010 | 3.66 | -0.771 | 0.014 | 1.158 |
| 6.45 | 1/8 | 3.34 | -0.208 | 0.016 | 3.57 | -0.486 | 0.014 | 1.463 |
| 8.00 | 1/8 | 3.59 | -0.372 | 0.007 | 3.83 | -0.619 | 0.008 | 1.300 |
| 9.50 | 1/8 | 3.80 | -0.476 | 0.009 | 4.03 | -0.703 | 0.014 | 1.195 |
| 11.00 | 1/8 | 3.97 | -0.499 | 0.010 | 4.20 | -0.713 | 0.012 | 1.126 |
| 6.45 | 1/13 | 3.93 | -0.135 | 0.012 | 4.16 | -0.396 | 0.010 | 1.374 |
| 8.00 | 1/13 | 4.18 | -0.341 | 0.011 | 4.41 | -0.584 | 0.015 | 1.279 |
| 9.50 | 1/13 | 4.37 | -0.410 | 0.018 | 4.60 | -0.627 | 0.013 | 1.142 |
| 11.00 | 1/13 | 4.53 | -0.444 | 0.016 | 4.76 | -0.658 | 0.017 | 1.126 |

[a] This number was obtained from fitting three points from the main text rather than solely from the values reported in this table.