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Entropic surface segregation for binary blends involving polymers of different flexibility

Polymers are commonly used in connection with other materials in different applications where controlling their surface properties is crucial. Predicting polymer surface properties in many applications such as coating, adhesion, wettability, and lubrication is necessary. The surface is unfavorable for polymer molecules, since they lose half of their interactions. Therefore, the component with lower surface energy will segregate to the surface. However, even in the absence of any enthalpic difference, segregation can also occur due to entropic effects. I study binary blends of polymers that are different in their lengths and flexibility, using self-consistent field theory (SCFT) in the grand canonical ensemble. The level of segregation is examined as the various system parameters are varied. The blend of stiff and flexible polymers and short and long polymers is simulated to see which polymer segregates to the surface. As a result, it is found that the entropic forces encourage surface enrichment of the flexible polymers in the first case and the short ones in the second case.