Polymer Adsorption onto a Stripe-Patterned Surface

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In recent years, polymer systems have received a great deal of attention from both, the experimental and the theoretical perspectives. However, a complete description of the properties of these materials does not currently exist. Therefore, further research is needed. This particular study is part of an ongoing effort to try to understand these systems and is focused on the adsorption of single polymer chains. Previous theoretical studies have provided phase diagrams that lay the foundations for a better understanding of the basic mechanisms of polymer adsorption. This particular study focuses on a single polymer chain in a confined volume and its adsorption onto a stripe-patterned surface.

A minimalistic simple-cubic lattice model was used where the chain is represented by an interacting self-avoiding walk (ISAW) and was confined between an attractive patterned wall and a steric wall with no interaction whatsoever. The pattern consisted of parallel stripes of defined width and separation. Besides the pattern parameters, three energy scales determine the phase diagram of the system: chain-surface attraction, chain-pattern attraction and chain self-attraction.

Chains of lengths up to $N = 19$ monomers were studied using the method of exact enumeration. The influence of the energy scales and pattern parameters on the system was analysed with the help of temperature vs. chain-pattern attraction phase diagrams. These diagrams were constructed by means of both canonical and microcanonical analysis of the enumeration data.

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