Phase Behavior of Mixed Polymer Brushes Containing Charged and Non-Charged Chains

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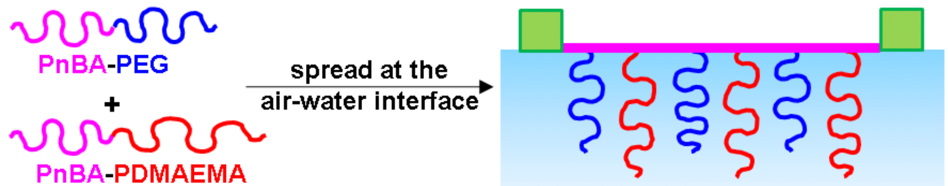
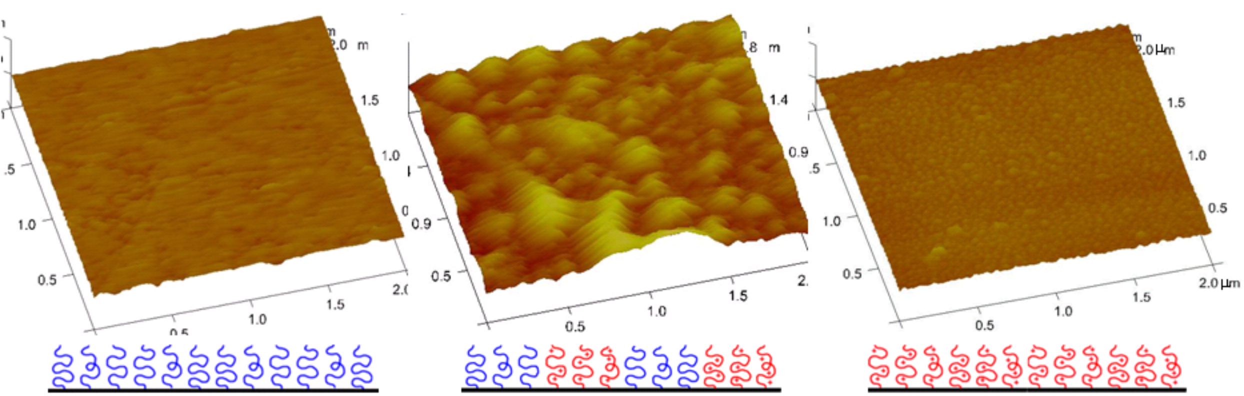


This project aims to study the structure and phase behavior of novel mixed polymer brush systems, namely, the mixed brushes composed of polyelectrolyte and neutral polymer chains. Accomplishments during the project period span both experimental and theoretical domains. Through development of new experimental model systems, we discovered a novel nano-structuring phenomenon of polyelectrolytes, termed “osmotic instability”. On the theoretical side, we derived a state-of-the-art self-consistent field (SCF) formalism capable of predicting, in full molecular detail, the complicated local ionization equilibrium in polyelectrolyte molecules.

We are currently performing combined experimental and theoretical studies of the structure and phase behavior of a mixed polymer brush system composed of PDMAEMA and PEO chains.



In recent experiments, we discovered that in this mixed brush system, the chemical dissimilarity between the two species results in the formation of microscopic phase-separated structures.