Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Polymer brushes in weakly interpenetrating regimes PARTH RAKESH DESAI, SHAYANDEV SINHA, SIDDHARTHA DAS, Univ of Maryland-College Park — We employ Molecular Dynamics (MD) simulations and develop new scaling laws to probe the behavior of semi-dilute polymer brushes in the weakly interpenetrating regime. This particular regime is characterized by the condition d_g being more than d_0 but less than $2d_0$, where d_g is the gap between two opposing surfaces with grafted polymer brushes and d_0 is the unperturbed brush height. Our results, showing excellent match between the MD simulation and scaling theory predictions, establish (a) unlike the classically studied case of strongly interpenetrating polymer brushes with d_g less than d_0, here the brush height (d), instead of being solely dictated by the interpenetration length, can be expressed in a power law form where d scales as N^{χ} (where N is the polymer size), (b) the exponent χ shows a monotonic increase with a decrease in the degree of interpenetration, (c) the interpenetration length shows a different scaling behavior as compared to the strongly interpenetrated case, and (d) the scaling behavior of the experimentally-witnessed variation of the compressive energy between the brushes can be reproduced.

Parth Rakesh Desai
Univ of Maryland-College Park

Date submitted: 11 Nov 2016 Electronic form version 1.4