

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

The Effect of Acid-Base Interactions on Conformation of Adsorbed Polymer Chains NISHAD DHOPATKAR, HE ZHU, Graduate Student, ALI DHINOJWALA, Professor — Adsorption of polymer chains from solutions is of fundamental interest in polymer science. This adsorption process is governed by the complex interplay between the solvent-polymer, polymer-substrate, and solvent-substrate interaction energies. In early 1970's, Fowkes and his coworkers have introduced the concept of acid base interactions in explaining why PMMA (basic) adsorption was extremely low on acidic substrates from acidic solvents. The acidic solvent molecules compete with the surface for binding with the basic polymer sites and this reduces the adsorption of PMMA. Here, by using interface-selective sum frequency generation spectroscopy (SFG) and attenuated-total-reflectance (ATR)-FTIR spectroscopy we directly measure whether the solvent or polymer molecules interact with the substrate in acidic, basic, and neutral solvents. Surprisingly, we find that the surface acidic site (hydroxyl) groups are still covered with PMMA chains in acidic solvent. The PMMA chains in acidic solvent adsorb with much higher fraction of chains as trains in comparison to loops and tails. Such differences in the static and dynamic conformations have consequences in understanding the exchange kinetics, colloidal stabilization, chromatographic separations, adhesion and friction, and stabilization of nanocomposites.

Nishad Dhopatkar
Graduate Student

Date submitted: 05 Nov 2015

Electronic form version 1.4