



~~~~ Polymer Physics Seminar ~~~~

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301 Steidle Bldg.

Applications of sum-frequency generation (SFG) vibration spectroscopy and low-frequency dielectrophoretic force microscopy (LF-DEPFM)

Surface characterization has become increasingly important for polymer surfaces. A variety of techniques combining vibrational spectroscopy and microscopy have been used to study various polymers. For such surface characterization studies key questions that need to be addressed include: What is on the surface? Where is it? Is it uniform and/or oriented? And how much is there? Our group currently uses advanced techniques to address some of these questions: Sum Frequency Generation spectroscopy (SFG), Scanning Polarization Force Microscopy (SPFM), and Low Frequency-Dielectrophoretic Force Microscopy (LF-DEPFM). These techniques can address what is present on the surface, where it is, and its uniformity and orientation. SFG is a non-linear vibrational spectroscopy technique that can detect molecular structure and orientation of non-centrosymmetric interfaces and bulk materials. SPFM is an AFM mode that images topography in a non-contact mode and also provides surface potential differences between an AFM tip and the underlying substrate. SPFM was used to probe a cationic polymer on a silicon wafer to determine its morphology as well as lubricious properties. LF-DEPFM was developed in-house for the characterization of surface charge uniformity in aqueous solution of various surfaces. The ability of these techniques to address the aforementioned surface characterization questions specifically for polymers is discussed.