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## Nanoscale Surface Morphology Induced by Poor Solvents on Glassy Polymer Films

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Thin polymer films are commonly used as samples in numerous areas of materials physics. Techniques applied to the preparation and application of thin films, including etching and nanolithography, often involve the addition of a solvent to the polymer surface. It is currently understood that there exist two classifications of polymer solvents. Good solvents are used to fully dissolve a polymer film while poor solvents are thought to have no lasting effects on a surface. However, recent research has shown that some poor solvents significantly impact polymer film surfaces and produce surface morphology on the nanoscale. In this study, polystyrene thin films of number average molecular weights ranging from 8000 g/mol to 545000 g/mol were produced through spin casting onto a silicon substrate. The films were then exposed to various poor solvents for differing time durations. The change in surface morphology was examined with an atomic force microscope and analyzed to determine the extent to which solvents change the polymer surface. It is shown that poor solvents produce a nanoscopic surface morphology with a characteristic length scale that is independent of the solvent used. The characterization results will allow for discussion of polymer surface morphology.

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