

# Switching Wettability Using Photochromic Polymer Brushes

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In this talk, we described a method for the formation of photochromic polymer brushes of spiropyran-based monomers using surface-initiated ring-opening metathesis. The growth of the polymer film, as monitored by ellipsometry and atomic force microscopy (AFM), is strongly influenced by the initial concentrations of the catalyst and monomer, as well as reaction time. These densely packed and highly smooth polymer films were successfully used as surfaces with switchable color and wettability using light as the external stimulus. The relatively nonpolar spiropyran can be switched to a polar, zwitterionic merocyanine isomer using light of the appropriate wavelength. This process is reversible and can be switched back using visible light. The spiropyran-merocyanine photoinduced isomerization gives a reversible contact angle change up to  $15^\circ$  for smooth Si/SiO<sub>2</sub> substrate under sequential irradiation cycles with UV and visible light. This contact angle change is amplified by complexing the merocyanine form with metal ions through the phenolate oxygen, which enhances the switching of wettability with these polymer brushes. Irradiation in the presence of cobalt(II) ions gives rise to a contact angle variation as high as  $35^\circ$ . Lastly, morphological changes accompanying photochromism of diluted polymer layers were investigated *in situ* using atomic force microscopy. Photoinduced single-molecular motion has been observed.