471h pH-Responsive Tethered Layers on Copolymer and Silicon Substrates

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The goal of this research is to develop novel polymer layers that exhibit significant changes in surface properties and layer thickness at surfaces and interfaces in response to environmental pH. The work presented here involves the synthesis and characterization of pH-responsive tethered layers on ethylene-co-acrylic acid copolymer film and self assembled monolayer (SAM)-modified silicon wafer substrates. Grafting of poly(tert-butyl acrylate) (PtBA) to the copolymer and silicon surfaces was followed by complete or partial conversion of the pendant tert-butyl ester groups to acid and various tertiary amine functionalities. Using this chemical scheme, a series of pH-responsive homopolymer and random copolymer layers was developed. FTIR spectroscopy was used to monitor the progression of the chemical reactions and the thickness change of the tethered layers was measured as a function of pH using *in situ* ellipsometry. In addition, the surface properties of these pH-responsive layers were investigated with *ex* and *in situ* AFM as well as variable pH static contact angle goniometry.