Abstract

This thesis explores the synthesis of thermoresponsive polymers using atom transfer radical polymerization (ATRP), a controlled polymerization technique that allows for a high degree of control over molecular weight, dispersity, and polymer architecture. For the thermoresponsive homopolymer preparation, di(ethylene glycol) methyl ether acrylate and tri(ethylene glycol) methyl ether acrylate were used. To enhance the functionality of these homopolymers, a 3-acrylamidophenylboronic acid pinacol ester monomer was incorporated into the polymer structure, forming copolymers with thermoresponsive, pH-responsive and diol and saccharides binding properties. The optimization of the ATRP process was achieved by adjusting various components such as the catalyst, ligand, solvent, and their respective ratios. The synthesized (co)polymers were characterized using nuclear magnetic resonance (^{1}H NMR) spectroscopy and gel permeation chromatography (GPC) to determine their structure, number average molecular weight, and its distribution. To precisely purify the obtained copolymers, dialysis against acetone was performed. Thermoresponsive properties were confirmed by determining its cloud point temperature via light scattering. The effect of phenylboronic deprotection on the cloud point temperature was also investigated. Ultimately these new pieces of information bring insights into the synthesis of thermoresponsive (co)polymers via ATRP and their possible application.