

ABSTRACT

This thesis reports the preparation of tailor-made polymers of various specialty functional monomers bearing reactive pendant functional groups via atom transfer radical polymerization (ATRP), followed by post-polymerization modification and characterization of the modified polymers. In this case, dicyclopentenylloxyethyl methacrylate (DCPMA), which has a reactive pendant bicyclo-alkenyl functionality was successfully polymerized via selective ATRP at ambient temperature. The polymers had controlled molecular weight and narrow dispersity (D). The polymer prepared by free radical polymerization was severely gelled and was not soluble in solvents like toluene, tetrahydrofuran and chloroform. The alkenyl functionality in the polymer was successfully modified via thiol-ene reaction, as evidenced by ^1H NMR and FT-IR analyses. ABA type block copolymers of 2-ethylhexyl acrylate (EHA) and DCPMA bearing reactive alkenyl functionality were prepared and characterized by ^1H NMR, GPC, AFM and DSC analyses. The prepared block copolymer was modified by thiol-ene chemistry. The thiol modified polymers showed better mechanical properties, as evidenced by lap shear test and surface hardness measurement. 2-(Acetoacetoxy)ethyl methacrylate (AEMA), a monomer having a pendant β -keto ester group was polymerized by ATRP and the polymers were characterized by NMR, GPC and DSC analyses. The metal-polymer complex of PAEMA was prepared by reacting pendant β -keto ester group with $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$, which was characterized by TEM, TGA and DSC analyses. Styrene-butadiene-styrene (SBS) triblock copolymer is a useful thermoplastic elastomer, because of its several important properties. In this case, SBS block copolymer having high vinyl content was chemically modified by thiol-ene reaction using different thiolating agents. It was observed that thiol modified SBS showed improved oil resistance property and better adhesion strength compared to the pristine SBS.

Keywords: atom transfer radical polymerization (ATRP), controlled radical polymerization (CRP), thiol-ene reaction, cycloalkenyl functionality, β -keto ester functionality, thermoplastic elastomer (TPE)