

Sittichoke Tabthong 2014: Aluminum Complexes Supported by Bis(pyrrolidene) Schiff-base and Salan Ligands for the Ring-Opening Polymerization of Lactides and ϵ -Caprolactone. Doctor of Philosophy (Chemistry), Major Field: Chemistry, Department of Chemistry. Thesis Advisor: Miss Pimpa Hormnirum, Ph.D. 183 pages.

This thesis consists of two parts. In the first part, a series of aluminum complexes bearing bis(pyrrolidene) Schiff-base ligands ($L^1AlMe-L^7AlMe$) were successfully synthesized and characterized by NMR spectroscopy and elemental analysis. In the presence of benzyl alcohol, complexes $L^1AlMe-L^7AlMe$ were found to catalyze the ring-opening polymerization (ROP) of *L*-LA and *rac*-LA with a well-controlled fashion. The ROP of *L*-LA was typically faster than that of *rac*-LA. Kinetic studies revealed the first order dependence on monomer. The flexibility of the ligand framework has a significant influence on the polymerization rate. The rates of polymerization decrease in the order $L^4AlMe > L^2AlMe > L^3AlMe > L^5AlMe > L^7AlMe > L^1AlMe > L^6AlMe$. Among these complexes, L^3AlMe had the highest stereoselectivity ($P_m = 0.80$).

In the second part, a series of aluminum complexes bearing bis(phenoxyamine) or Salan ligands ($L^{1A}AlMe-L^{3C}AlMe$) were synthesized and were characterized by NMR spectroscopy and elemental analysis. In the presence of benzyl alcohol, the *rac*-LA polymerization reactions mediated by all complexes proceeded in a controlled manner. Kinetic studies revealed that the polymerization rates decrease in the order $H > Ph > ^iPr \gg ^tBu$. Heterotactic PLA was produced when the bulky substituents were introduced to the phenoxy rings. All complexes also showed a good performance in the polymerization of ϵ -CL. The copolymerizations between *rac*-LA and ϵ -CL were well controlled in terms of molecular weight and molecular weight distribution. The block copolymers were produced by this catalytic system.

Student's signature

Thesis Advisor's signature