

Chemistry Department

Weekly Graduate Student Seminar

Synthesis and ring opening polymerization of 6-methoxymethyltetrahydro-2-pyrone

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Due to the economic and environmental concerns of highly consumed fossil-based thermoplastic polymers, there is a demand for preparing new renewable polyesters with improved properties over existing material such as polylactic acid. This can be achieved by polymerization of functionalized monomers that could be renewably sourced. Commercial lactones such as ϵ -caprolactone and lactide are well-established monomers used for polyester synthesis; however, approaches to preparing functionalized polyesters are comparably scarce. This work presents ring opening polymerization of a renewably sourced monomer, 6-alkoxymethyltetrahydro-2-pyrone, which is a lactone molecule bearing an alkoxy side group. The tunable functionality is a novel feature that differentiates this monomer from a current host of widely utilized lactone monomers. 6-methoxymethyltetrahydro-2-pyrone was successfully synthesized from methyl cyclopentanone-2-carboxylate and polymerization was carried out using the diphenyl phosphate (DPP) catalyst and benzyl alcohol initiator. Equilibrium polymerization was observed for the polymerization of this monomer, and thermodynamic and kinetic parameters were determined. The ability to control molecular weight using varying monomer/initiator ratios was investigated. Finally, an active chain end mechanism occurring concurrently with an activated monomer mechanism were identified as pathways that contribute to the molecular weight control of polymers.

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Room 316 Aubert Hall

Light refreshments available