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PREPARATION OF NANOCOMPOSITES POLY(-CAPROLACTONE)/ CELLULOSE NANOFIBERS BY IN SITU RING-OPENING POLYMERIZATION

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Biodegradable and biocompatible polymers from inexpensive renewable resources are gaining attention in both academic and industrial circles. One of the most promising class of polymers in this field are polylactides (PLA) and polyε-caprolactone (PCL) which are formed by ring-opening polymerization of lactides and ε-caprolactone. PLA and PCL have numerous applications ranging from environmentally friendly bulk packaging materials to control-released drug delivery agents, artificial sutures, and polymer matrices for tissue engineering. However, the applications of PLA and PCL polymers are limited because of their deficiencies in mechanical and properties. One option is to incorporate an environmentally acceptable filler to improve the properties of such biodegradable polymers particularly for use as packaging materials. Cellulose are suitable fillers that are naturally abundant, inexpensive, biodegradable, and from renewable resources. Being toxin free, they can be used as components for food, medical, cosmetic, and health-care recipients. Therefore, PLA or PCL cellulose nanofibers nanocomposites have advantage of adding biocompatibility and biodegradability to the traditional properties of nanocomposites. Such nanocomposites can be prepared by direct melt-intercalation, by solvent intercalation, or by in situ ring-opening polymerization of lactide and ε-caprolactone, of which the latest is the main method. In this context, it is the purpose of this work to study the usefulness of titanium (IV) alkoxides as catalysts for the ring-opening polymerization (ROP) of ε-caprolactone in the presence cellulose nanofibers as nanoreinforcements.