FORMATION OF STEREOCOMPLEXES FROM STAR-SHAPED COPOLYMERS OF ε-CAPROLACTONE AND LACTIDE

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During the last decade polymers based on ε-caprolactone (CL) and lactide (LA) have attracted increasing interest due to their useful properties. Owing to their biodegradability and biocompatibility they are investigated world-wide particularly for biomedical and pharmacological applications. Star polymers based on CL and LA have attracted even more attention because of their interesting physical and chemical properties.

Additionaly macromolecules of homo- and copolymers of LA and CL of identical chemical composition but different stereochemical configuration of lactide repeating units (D-LA, L-LA) are able to form intermolecular complexes called stereocomplexes. Stereocomplexes usually form crystalline structures that melt at higher temperatures (T_m) than homochiral component crystalline phase does. Unfortunately in stereocomplexes obtained from linear polyesters based on D- and L-LA there is not enough memory preserved to survive melting process and a mixture of homochiral and stereocomplex crystallites is formed after this.

Enantiomeric star-shaped, hydroxyl-terminated block copolymers of CL and LA (D- or L-LA) were successfully synthesized via sequential ring-opening polymerization of CL and D- or L-LA with multifunctional initiator such as pentaerithritol (PTOL) or dipentaerithritol (DPTOL) and stannous octoate ($SnOct_2$) catalyst. Possibility of formation of stereocomplexes based on synthesized star copolyesters and their properties were examined. Obtained materials were characterized by gel permeation chromatography, NMR and IR spectroscopy as well as differential scanning calorimetry (DSC).