Synthesis and Characterization of Star-Shaped (PCL-B-PEG) as Potential Electrospun Microfibres

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Abstract

Star-shaped polymers have vast potential in application due to their architecture. In this study, a 6-arm star-shaped of poly(epsilon-caprolactone)-b-poly(ethylene glycol), (6PCG) was synthesized via ring opening polymerization, (ROP) of epsilon-caprolactone and Steiglich esterification (coupling reaction) to attach the PEG arm to the star-shaped polymer with discrete core of dipentaerythritol. The polymer chemical structure was characterized by FT-IR. The molecular weight (Mn) determined from 1H NMR spectra showed that the star polymer has approximately the same molecular weight as the theoretical value. The polydispersity index indices (PDI) (>1.5) from GPC were narrow suggesting controlled polymerization reaction. Thermal stability of the star-shaped 6PCG were examined using thermogravimetric analysis, (TGA) and differential scanning calorimetry, (DSC) and showed slight increase compared to homopolymer star PCL due to the changes of end-group functionalities. Six-arm star-shaped PCL-b-PEG was dissolved in chloroform/methanol solvents and the resulting solution was used for electrospinning process. The morphology of nanofibres showed fine fibres without beads and thus a possible potential for several applications.

Keywords

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