Formation of Poly(3-hydroxybutyrate) Inclusion Compounds with Urea and Thiourea

Ravindran, Pavithran

Poly(R-3-hydroxybutyrate) (PHB) is a biopolymer that has been gaining interest throughout recent years for its biocompatibility and biodegradability. PHB has been studied for use as drug-delivery systems, fibroblasts and platforms for tissue acculturation. However, these applications of the polymer are hindered by its high crystallinity and fast crystallization rate. This study involves creating an inclusion complex of PHB with urea and thiourea. Inclusion complexes provide a confined environment that makes it easier to study the single chain behavior of polymers as well as organizing the polymer to produce more advantageous mechanical properties. These complexes have been characterized using differential scanning calorimetry (DSC), Fourier Transform Infrared Spectroscopy (FTIR) and X-ray Diffraction (XRD). PHB was then coalesced from the complexes and its thermal and crystallization behaviors were compared to those of neat PHB. Unusual crystallization behaviors of the PHB coalesced from the urea were noted. Polymers coalesced from inclusion complexes are usually higher in crystallinity; however, PHB from urea has a lower crystallinity, making it more compatible for applications in the medical field.

Awards Won:

Second Award of $2,000