Bhavya Singhi et al., J Material Sci Eng 2016, 5:10(Suppl)
http://dx.doi.org/10.4172/2169-0022.C1.056

Solvent spinning of bacterial polyester

Bhavya Singhi, Radhika Vaid and **Martin W King**
North Carolina State University, USA

Polyhydroxyalkanoates (PHAs), known as bacterial polyesters, are considered novel polymers because of their biodegradability. A wide range of hydroxyalkanoate units, such as butyrates and valerates, are produced by bacterial synthesis. These units can be polymerized and copolymerized with varying mechanical and structural properties. Due to their biocompatibility, PHAs have been introduced in the fabrication of medical products, such as sutures and wound dressings. Some studies have explored the use of bacterial polyester for controlled release applications with thermally sensitive chemicals and drugs. Since PHAs are melt spun at temperatures as high as 200°C, this requires a post-spinning stage for chemical and drug incorporation. Hence, there is a need for low temperature spinning of bacterial polyester to prevent drawbacks of post-spinning drug incorporation, such as a non-uniform absorption that leads to an uneven release profile. To achieve this goal, we analyzed PHA solubility properties to develop a solvent spinning process at low temperature. Next we compared dissolution of poly(3-hydroxybutyrate-4-hydroxybutyrate) (P34HB) in multiple solvents such as tetrahydrofuran, dioxane, methylene dichloride and chloroform. This solvent study found methylene dichloride as the most suitable solvent. As a result, spinning dopes of various concentrations were coagulated and regenerated as polymer films in methanol at different temperatures to determine the optimal coagulating conditions. Currently, we are working on the production of continuous filaments using this solvent spinning process. This study would help in developing a single step process for drug incorporation during fiber spinning, which can be utilized for drug delivery applications.

Biography

Bhavya Singhi is in the process of completing her MS in Textile Chemistry and plans to pursue a PhD in Fiber and Polymer Science at North Carolina State University, Raleigh. She graduated in 2014 with a BTech degree in Fibers and Textile Processing Technology from the Institute of Chemical Technology, Mumbai, India. She has worked on various projects involving polymer technologies such as encapsulation, extrusion and synthesis. Her research interests include polymer degradation, biopolymers and non-woven fabrics.

bsinghi@ncsu.edu

Notes: