

Biodegradable Soy Protein for potential applications

Abstract

Biopolymers produced from various natural botanical resources such as starch, protein and cellulose are regarded as an attractive alternative to petroleum based plastics since they are abundant, renewable, inexpensive, environmentally friendly plant protein. Among plant protein sources, soy protein has been regarded as a readily renewable biopolymer. It can be used as a biodegradable plastic, tensile fiber, biodegradable plastic membranes, adhesive, packaging materials, and various binders. Soy polymers technology can create an age of green plastics in the twenty first century. The commercially available soy products are soy protein isolate (SPI), soy protein concentrate (SPC), soy flour (SF).

In this project extraction of soy protein is from soy bean seed is done using several methods and characterization of the extracted soy protein has been done using techniques such as Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM) and Thermo Gravimetric Analysis (TGA). Soy protein bionanocomposites were prepared by incorporating different volume fractions of nanocellulose obtained from the pseudo stem of the banana plant (*musa sapientum*) in soy protein isolate with glycerol as plasticizer. Thermal properties, mechanical properties were evaluated by Thermogravimetric analyzer (TGA), universal testing system (UTS). Also studies based on swelling and biodegradability were done. Banana nanocellulose reinforced soy protein isolate composites showed improved thermal and mechanical properties when compared to soy protein isolate plastic. Biodegradation of the material under

soil burial conditions showed a faster degradation rate for the protein component. The environmental friendly, fully biodegradable green composite based on soy protein, banana fiber, have excellent properties and great potential to replace the traditional petroleum based materials in applications.