UNIVERSITY OF WATERLOO

TECHNOLOGY SUMMARY

A Bio-based Paste made from Renewable Materials for Packaging Applications

Background

Many of the synthetic plastics used in today's world are petroleum based, which is problematic as they are a major global pollutant, have minimal biodegradability, and are composed of non-renewable resources. This has spurred the development of environmentally friendly and biodegradable materials from low-cost or freely available natural and renewable resources. The use of plant-derived materials in such technologies would benefit greatly due to their low toxicity, high biodegradability, and improved recycling options.

Soy protein originates from soybeans, which is one of the most abundant plants globally due to their prominent role in the oilseed industry. Soy protein isolate (SPI) has attracted considerable attention in the field of packaging technology due to its easy processability, biodegradability, and good film-forming characteristics. However, SPI-based films often suffer from inferior mechanical properties and high moisture sensitivity, thus restricting their practical application.

Description of the invention

The proposed invention allows for the creation of a novel biomaterial using recycled waste products including SPI and paper fibres. This material relies on the induction of protein crosslinking with non-toxic additives and crosslinking agents, combined with a cellulose base to create a paste that can be molded or extruded (via 3D printing) to produce any desired shape. Heat curing allows the solidification of the final product.

Advantages

This material combines two renewable waste products, namely SPI and paper fibres to produce a naturally biodegradable and biocompatible paste. This material can be molded, extruded, or formed to any shape and in particular rolled for packaging applications. All components and additives are composed of generally regarded as safe (GRAS) materials. The addition of additives such as pigments for colour can easily be incorporated. The final mechanical properties can be tailored based on curing time and temperature.

Potential applications

- Packaging materials
- Medical applications such as tissue engineering, scaffold development and biodegradable implants or prosthetics
- Cosmetics industry for in biodegradable packaging or as an exfoliant
- Use in prototyping or modelling for manufacturing

Reference

10243

Patent status

US Provisional Filed.

Stage of development

Prototype developed and currently being validated.

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