A biodegradable and biobased intumescent flame-retardant for polylactic acid textiles and composites

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Propositions

Belonging to the dissertation:

A Biodegradable and Biobased Intumescent Flame-retardant for Polylactic Acid Textiles and Composites

1. Flame retardancy is an active research subject, developing numerous and efficient strategies to endow polymers with good fire-resistant properties.
2. Bioplastics issued from renewable resources represent an interesting alternative to polymers made of fossil carbon, which could be helpful in reducing carbon footprint.
3. From variety of biomolecules and green processes, new flame-retardant solutions can be proposed.
4. Most of the conventional flame-retardants are non-biodegradable and if disposed in the landfill, microorganisms in the soil or water cannot degrade them. Hence, they remain in the environment for long time and may find their way in the food chain.
5. In bicomponent fibers, selection of appropriate polymer for each component (preferably matrix and reinforcement from same polymer) is necessary for a stable and uniform interface for better adhesion of the components.
6. The optimization of the additives composition, temperature profiles and thermal processing conditions are the key factors to obtain the desired functional and mechanical properties of the fibers containing flame-retardant bio-macromolecules.
7. Some of the bio-macromolecules can be obtained as a waste material or a by-product from wood industry or from agro or food industry therefore, can present another added value to these industries.
8. The repossessions and succeeding applications of bio-macromolecules as flame-retardants may fulfill the current requirements of valorization of wood, food and agro-industries thus, avoiding their landfill detention.
9. Textile is one of the world's largest market mainly based on synthetic fibres used in consumer products and are subjected to flame-retardant requirements, which need to be taken into account during product development.