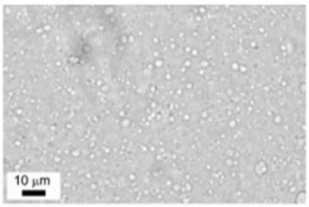
Biorenewable Blends of Polyactide

and Acrylated Epoxidized Soybean Oil Compatibilized by a Polyactide Star Polymer



PLA / AESO / SOY blend

Summary

An innovative additive composition for improving the toughness of polyactide (PLA). The biorenewable additive material is composed of a combination of acrylated epoxidized soy bean oil (AESO), unmodified soy bean oil (SOY), and a compatibilizer. When blended with PLA, this produces a matrix of AESO and SOY oil droplets dispersed throughout PLA. AESO and SOY are immiscible in PLA, which allows for improvements in the toughness without causing plasticization or altering the resistance to heat of the material. A compatibilizer is used to decrease oil droplet size and increase adhesion between the immiscible plastic and oil regions within the blend. The blend is formed by mixing PLA with the additive, casting the mixture, and drying at high temperature. The resulting PLA and additive blend has an increased toughness and resistance to breakage. Thus, the blend has mechanical characteristics that are more comparable to petroleum-based thermoplastics than neat PLA.

Competitive Advantages

- PLA and additive blend are derived from renewable, non-toxic sources
- Chemical components of the additive are readily available
- 5 times greater toughness in comparison to neat PLA
- 9 times greater elongation at break values in comparison to neat PLA
- Comparable glass transition temperatures to neat PLA
- No plasticization when the PLA is blended with the additive

Meet the Inventor

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Problem Addressed

- Improving the mechanical characteristics of PLA with a biorenewable additive
- Environmentally friendly replacement for petroleum-based engineering thermoplastics
- Increasing the toughness of PLA without impacting the material's resistance to heat or causing plasticization

Applications

- Automotive plastics
- Building and construction
- Furniture
- Industrial products
- Medical devices
- Consumer products, such as plastic bottles, packaging, and textiles

Patents

- US2016/062503

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