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Novel biobased aromatic and aliphatic polyesters from carbohydrates

New biobased aromatic and aliphatic polyesters that can replace isosorbide-based polyesters with improved properties (mechanical, thermal, optical and chemical resistance) have been patented. Partners to further develop the system and/or to establish commercial agreements along with technical cooperation are sought.

The Challenge

The development of biobased materials, especially those derived from carbohydrates, has the potential to reduce the amount of petroleum consumed in the industry as well as opens new high-value-added markets to agriculture.
Nowadays great attention is given to isosorbide-derived polyesters, due to the non-toxicity and the rigidity provided by the use of carbohydrate-derived isosorbide. However, relevant alternatives to isosorbide have not been presented up to now.
Bicyclic diacetalized carbohydrate-derived alditols and aldaric acids stand out as a novel and renewable source for obtaining biobased polyesters with similar or even improved properties than isosorbide-based polyesters.

The Technology

The present invention relates to the obtention of both aromatic and aliphatic biobased homopolyesters and copolyesters derived from bicyclic diacetalized carbohydrate-derived alditols and aldaric acids.
The aromatic polyesters are high performance materials with good mechanical, thermal and optical properties and good chemical resistance. The degradability and thermal properties of aromatic polyesters can be modified by the introduction of diacetalized carbohydrate-based units. In addition, derivatives of carbohydrates with bicyclic structure allow obtaining aromatic polyesters with high glass transition temperature and good thermomechanical resistance. These polyesters can be used in a wide variety of applications ranging from carbonated beverage bottles to the use as a glass substitute material in the form of thick sheets. On the other hand, aliphatic polyesters are among the most widely used biodegradable polymers with applications from the biomedical sector to packaging. In these fields, the use of derivatives of carbohydrates with a bicyclic structure allows obtaining biodegradable and environmentally friendly aliphatic polyesters with improved mechanical and thermal properties, especially those related to stiffness.

Innovative advantages

- The use of bicyclic diacetalized alditols and aldaric acids in aromatic and aliphatic polyesters is motivated by several features: they are rigid, chiral, and non-toxic.
- For these reasons, polyesters with high glass transition temperature, controlled degradability and/or with special optical properties are synthesized.

Current stage of development

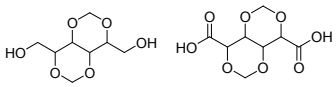
At the laboratory scale with main thermal and mechanical properties evaluated.

Applications and Target Market

New business opportunity for polymer manufacturers to fabricate and commercialize novel biobased polyesters, which can replace the aromatic and aliphatic polyesters currently used in packaging and as fibers and fabrics. Thus, applications of these new polyesters are films by extrusion and casting for support and packaging, films for thermoforming, injection molding, and hydrolysable and biodegradable fibers.

New polyesters that can replace the polyesters currently used in packaging

Can be used as a glass substitute material in carbonated beverage bottles



Use of bicyclic diacetalized alditols and aldaric acids in aromatic and aliphatic polyesters

Business Opportunity
Technology available for licensing with technical cooperation

Patent Status
Priority application

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