

BIOMIMETIC POLYESTER

CSIC and the University of Málaga have patented a new procedure for the synthesis of polyaleurate polyester, a mimetic polymer of plant cutin, and its use as a biodegradable packaging material for food or active ingredients. It consists of a non-toxic plastic polymer which can be obtained from raw materials coming from vegetable wastes.

The new procedure uses neither solvents nor catalysts, saving in raw materials, reduction of waste and the production of a higher purity biodegradable material which can be thrown away without risk of contamination. It is also possible to give the desired form to the material, using different casts in the process.

Due to the simplicity of the manufacturing process, its implementation on an industrial scale would not involve any additional effort.

An offer for Patent Licensing

Biodegradable material for packaging

The protected invention consists of a new method for the synthesis of polyaleurate polyester through a polymerization carried out in the melted state. The polyaleurate is a three-dimensional highly crosslinked polymer, chemically and structurally similar to the biopolyester cutin, which is the mayor component of the plant cuticle (the continuous and lipidic extracellular membrane that covers the aerial parts of leaves, fruits and non-lignified stems of plants). The polyaleurate polyester has a glass transition temperature of around $-1.9\text{ }^{\circ}\text{C}$, an elastic modulus of 17 MPa, water absorption of 4% relative to the weight of the dry sample and water permeability of $2.6 \cdot 10^{-5}$ m/s.

The result is a highly hydrophobic conformable polymer, presenting low water permeability, with an acceptable degree of plasticity and not toxic due to its chemical similarity with plant cutin. For the same reason, the material is completely biodegradable, making it ideal for plastic packaging for food or active ingredients. The procedure also allows the use as precursor for the fabrication of organic wastes coming from plant and fruit industry, resulting in a 100% sustainable process.

Main innovations and advantages

- Biomimetic polymer, non toxic, analogous to the one found in fruit skin, leaves and stems incorporated into the human diet, ideal for making food packaging or packaging for active ingredients.
- Minimum environmental impact of the manufacturing process because water vapor is the only waste generated and no toxic solvents are used. It is also a biodegradable material that can be discarded without causing associated pollution.
- The material can be obtained from plant waste, resulting in a 100% sustainable process.
- Due to the simplicity of the process, it is easily transferable to an industrial scale. It involves a reduction in costs, because other chemicals such as catalysts are not needed, nor are other methodologies required, apart from the precursor heating. Decreased production time (2-4 hours), and increased efficiency of the material synthesis reaction.
- Purity improvement of the product and possibility of choosing its shape and extension. The material blocks certain radiation, also serving as a light protector.



Biomimetic polymer, non toxic, analogous to the one found in fruit skin, ideal for making packaging for food or active ingredients. Minimum environmental impact fabrication process produces a biodegradable material that can be discarded without causing associated pollution.

Patent Status

PCT ("International") application filed. Priority established by a Spanish patent application.

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