

Patent alert November 2024

Biomaterials

This month's selection in brief

The term "biomaterial" can have two primary concepts: materials derived from biological sources (biobased materials) and materials compatible with biological systems (biocompatible materials, often for biomedical applications). In the textile and plastics industries, biomaterials are widely employed to develop more sustainable alternatives. This patent alert highlights recent patent applications showing the use of biomaterials as natural sources for coatings, binders, and composites.

Selected patents

Compositions based on polyhydroxyalkanoate(s) for the production of 3 D printing filaments, formulations comprising these compositions, process for the preparation of the said formulations and corresponding consumable filament for 3 D printing.

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Compositions based on polyhydroxyalkanoate(s) for the production of 3 D printing filaments, formulations comprising these compositions, process for the preparation of the said formulations and corresponding consumable filament for 3 D printing.

Patent number: EP4166612

Publication date: 2023-04-19

Applicant(s): POLYMARIS BIOTECHNOLOGY

Inventor(s): COURTOIS ANTHONY [FR], THOLLAS BERTRAND [FR]

Summary

The invention relates to consumable filament formulations and compositions for 3 D printing comprising at least one polyhydroxyalkanoate (PHA). The PHA compounds are particularly useful for their biodegradability, high compatibility and availability from renewable resources. Particularly, these biopolymers are much better compostable and biodegradable than polylactic acid (PLA).

Furthermore, the biotechnological production of these PHAS uses in particular biofermenters which make it possible to perfectly control the production conditions of this biopolymer.

Formulations	Température des zones de chauffe de l'extrudeuse (°C)	Pression (bars) et vitesse de rotation de la vis (rpm)	Vitesse de tirage (m.min ⁻¹)	Température du bac de refroidissement (°C)	Résultats
F1 : essai 1	De 150 à 175	/	/	8	-Filament de 2mm -Matière collante
F1 : essai 2	De 150 à 175	20 43	/	50	-Filament de 1,7mm -Matière moins collante que essai 1
F1 : essai 3	De 150 à 175	20 38	4,3	50	-Filament de 1,75mm -Obtention d'une bobine de filament -Mais matière qui reste collante
F2	De 150 à 175	19 38	4,3	50	-Filament de 1,75mm -Obtention d'une bobine de filament -Matière moins collante que F1 essai 3
F3	De 150 à 175	11 38	4.3	50	-Filament de 1,75mm -Obtention d'une bobine de filament

Bio-based and compostable elastomeric materials, methods of manufacture and articles and uses thereof

Patent number: WO2024/130428

Publication date: 2024-27-06

Applicant(s): BIOASTRA TECHNOLOGY

Inventor(s): RAJAGOPALAN SUMITRA [CA]; SUAREZ OSCAR [CA]; KUMAR PRAJWAL [CA]; TOKAREV ALEXEI [CA]; COTTENYE NICOLAS [CA]; HADAEGHNIA MILAD [CA]; ZEMZEM MOHAMED [CA]

Summary

An object of this invention is to provide elastic materials that preserve the performance and process attributes of polyurethanes and elastane while changing the chemical composition to a 100% bio-based and compostable material. There are provided compositions, systems and methods to fabricate bio-based and biodegradable elastic materials in the form of fibers, foams and molded objects, as well as various articles made using the same. The elastic materials consist primarily of di-acids and di-alcohols with or without crosslinkers and supporting polymer structures.

High heat resistant, biodegradable materials for injection molding

Patent number: WO2023/194663

Publication date: 2023-10-12

Applicant(s): SULAPAC OY [FI]

Inventor(s): PELTOLA HEIDI [FI]; MERILÄINEN KATI [FI]; KONTINEN JOONA [FI]; PÄRSSINEN ANTTI [FI]

Summary

The invention provides a biodegradable composite material featuring a ternary biopolymer blend that exhibits high heat resistance and is suitable for injection molding. The composite comprises elastic biodegradable polyester, polyhydroxyalkanoate, and biodegradable aliphatic polyester, reinforced with lignocellulosic particles and inorganic fillers. This material is designed for food contact articles, offering advantages such as improved mechanical properties, biodegradability, and low environmental impact. \

Sample	PLA (wt.%)	PBS (wt.%)	PHBH (wt.%)	Wood (wt.%)	Talc (wt.%)	HDT-B (°C)	HDT-A (°C)	Modulus (GPa)	Strength (MPa)	Strain at break (%)	Impact strength (kJ/m²)
COMP-1	1	43.5	9	20	25	101.7	78.8	3100	28.4	3.0	10.9
COMP-2	5	35.5	9	24	25	98.6	69.8	4122	27.7	2.0	7.0
COMP-3	1	39.5	9	24	25	97.7	71.6	3560	25.8	2.7	8.5
COMP-4	5	38.5	10	20	25	99.2	67.5	3827	27.8	2.4	8.1
COMP-5	7,5	36	10	20	25	95.7	66.8	4078	28.2	2.3	7.9
COMP-6	10	33.5	10	20	25	97.4	66.6	4165	29.2	2.0	7.5
REF-A	10	15	28.5	20	25	106.0	69.7	4589	30.4	1.6	6.2
REF-B	15	10	28.5	20	25	110.0	71.1	5771	32.6	1.3	5.6
REF-C	0	10	43.5	20	25	107.7	n.d.	4129	27.9	1.3	6.1
REF-D	0	20	33.5	20	25	104.0	n.d.	4148	27.5	1.5	6.7

Epoxy resin composition with bio-based granular material

Patent number: WO2024/027960

Publication date: 2024-02-08

Applicant(s): SIKA TECH AG [CH]

Inventor(s): VIAS PARRADO ANA [DE]; SARIOGLU OGUZ [DE]; HEKEL ANGELIKA [DE]; KASEMI EDIS [CH]; BYRNE MICHAEL [GB]; PUSEL THOMAS [DE]; GRÖTZINGER JOCHEN [DE]

Summary

It is an object of the present invention to provide an epoxy resin composition which is suitable for floor coating purposes and which contains additives which can be readily mixed in and readily redispersed after storage, and which permit optically high-quality coatings having a flawless and smooth surface.

The epoxy resin compositions comprising a resin component containing at least one epoxy liquid resin, a hardener component containing at least one amine hardener, and at least one bio-based granular material obtained from shell nuts or olive kernels, and a lignin content. The composition is free from inorganic fillers.

This invention offers advantages over prior art, including improved redispersability of the bio-based granulate, which maintains performance after storage. The composition also allows low viscosity and rapid curing at low temperatures, making it suitable for cold environments. Additionally, the reduced reliance on inorganic fillers enhances sustainability and minimizes environmental impact.

Method of treatment of a fiber-reinforced composite

Patent number: EP4441144

Publication date: 2014-10-09

Applicant(s): SYENSQO SA [BE]

Inventor(s): FERRÃO VICTOR [BR]; BILLAUD CLAUDE [FR]; TADMOURI RAWAD [FR]

Summary

The invention relates to a method of treatment of a fiber-reinforced epoxy composite which comprises contacting the fiber-reinforced epoxy composite with a bio-based solvent chosen from levoglucosenone and/or a levoglucosenone derivative such as cyrene, wherein the treatment temperature generally exceeds by at least 10°C the glass transition temperature of the fiber-reinforced epoxy composite.

This method enhances the swelling and degradation of fiber-reinforced epoxy composite, improving their recycling process.

	Comparative examples					Invention
Example	CE1	CE2	CE3	CE4	CE5	E1
Solvent	BZA	PLC	CRN	BZA	PLC	CRN
Treatment temperature T_{tr} (°C)	100			200		
Swelling ratio r_{sw} (%)	2	0.3	0.3	12	13	20
Exfoliation degree d_{exf} (%)	0	0	0	75	31	50
Degradation perf. index PI_{deg}	0	0	0	9	4	10
“Green solvent” attribute				No	Yes	Yes

Leather-like material of vegetable origin made from persimmon puree

Patent number: WO2024/078705

Publication date: 2024-18-04

Applicant(s): PERSISKIN S L [ES]

Inventor(s): SANFÉLIX PALAU JAIME [ES], VLADAN MARÍA [ES]

Summary

The present invention relates to a vegan and reusable leather type material of vegetable origin, at least 50% and preferably at least 80% biobased. This material is based on a composition which comprises persimmon (Diospyros kaki) mass and a polymer derived from a polyol of vegetable origin. The invention also discloses the process for obtaining the material. The leather-type material may be used in a variety of goods products in the textile such as clothes, footwear products or accessories. The material has proven to keep the same mechanical properties as the animal origin or synthetic leather, being a sustainable alternative which, in addition, contributes to circular economy. The sustainable material, leather-type of vegetable origin, provides an alternative to known leathers, with less environmental impact.

Layer	Thickness (mm)	g/m ²	% wt.	% Biobased per layer	% biobased final
Polyurethane (top layer)	0.10	89.25	17.02	> 47	> 7.99
Persimmon (medium layer)	0.30	197.65	37.70	100	37.70
Adhesive	0.05	40.00	7.63	> 50	> 3.81
Textile (bottom layer)	0.30	197.37	37.65	100	37.65
FINAL MATERIAL	0.75 mm	524.27	100 %		> 87.15

Biobased binder compositions for nonwoven materials

Patent number: WO2024/096808

Publication date: 2024-05-10

Applicant(s): ORGANOCLICK AB [SE]

Inventor(s): MARIA WENNMAN [SE], MÅRTEN HELLBERG [SE]

Summary

The present invention relates to biobased binder compositions which are environmentally benign, renewable, compostable and/or biodegradable. The biobased compositions comprise chitosan, an acid and a plasticizer. By treating a nonwoven material with a biobased binder according to the present invention, it is possible to provide a nonwoven material exhibiting excellent mechanical properties. The binder composition according to the present invention is easy to use for treatment of different types of nonwoven materials and can be adapted to provide specific properties to certain nonwoven materials and applications.

	Binder A	Binder B
RAW MATERIAL	wt%	wt%
Tap water	61.41	60.61
Hydrolyzed starch syrup (70%)	35.00	35.40
Chitosan	2.10	2.20
Lactic acid (80%)	1.40	1.40
Acticide AB6	0.09	0.09
NaCl	0.00	0.30
Sum	100	100

Table 1. Binder compositions

Cellulose ester polymer composition having low coefficient of friction

Patent number: WO2023/242076

Publication date: 2023-12-21

Applicant(s): LEGO AS [DK]

Inventor(s): HOFMANN JOHN THOMAS [US]; FENG WENLAI [US]; SPENCER DAVID CHRIS [US]; HOFMANN KATHERINE AUGUSTA [US]

Summary

The object of the invention is to provide a cellulose ester composition suitable for various applications, particularly in the manufacture of molded plastic articles such as construction toys. The new composition aims to reduce the coefficient of friction while maintaining desirable mechanical properties (maintains high impact strength and thermal stability ($HDT > 85^{\circ}\text{C}$)), making it ideal for repeated assembly and disassembly in toy applications.

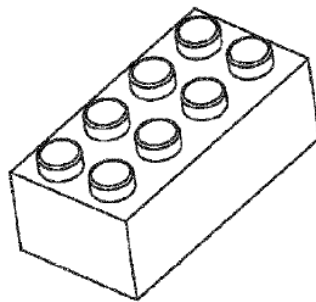


Figure 1

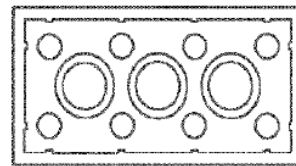


Figure 2