

Patent alert October 2025

Markers for recycled content verification

This month's selection in brief

How to distinguish recycled from non-recycled plastics? How to measure the recycled content of a product made of mixture of waste and virgin products? How to enhance traceability in recycled plastics? These are a few of several questions which need answering to enhance use of plastic waste into new products. An answer to these questions is including markers into recycled plastics enabling traceability and verifiable recycled content which is the focus of this this month's selection.

Patents:

Markers for recycled plastics.....	2
Recyclate verification.....	3
Method for producing a material with verifiable proportion of recycled material	4
Balancing of recyclable material amounts in product ecosystems	5
Recyclable racket sports ball and method of recycling a mixed waste stream comprising said ball.....	6
Silicon nanostructures as luminescent markers for the recycling of plastic	7
Recycling method and taggant for a recyclable product.....	8
Method and system for marking, tracking, grading and certifying plastics for enabling standardization and tokenization	9

Markers for recycled plastics

Patent number: WO2025118173

Publication date: 2025-06-12

Applicant(s): DOW GLOBAL TECHNOLOGIES LLC

Inventor(s): HAN YAOKUN; LIANG BING; JI ZHOUHUA; ZHAO YONG; JI JIE; JAZDZEWSKI BRIAN

Summary

This invention provides a novel polymer formulation designed for the recycling industry, comprising a thermoplastic polymer such as poly(ethylene terephthalate), polyethylene, or polypropylene, blended with specific marker compounds. These marker compounds are characterized by their chemical and thermal stability at high temperatures, making them suitable for use in recycled plastics. The formulation enables the identification and quantification of recycled content in plastic products, meeting regulatory requirements for safety and environmental standards. By utilizing low concentrations of these markers, the invention overcomes limitations of previous methods that relied on higher concentrations, which could compromise the material's properties or pose safety risks. The polymer formulation is particularly beneficial for manufacturers who need to demonstrate compliance with increasing demands for recycled content in consumer goods.

Designation	Material	Boiling Point	% Stability	Source/ Synthesis
r-PET	Semi-dull recycled PET chips.			REO-ECO
M. 1	2-sec-Butyl-1-(decyloxy)-4-tritylbenzene	>400°C		WO2014/008164
M. 2	1,3,5-triphenylbenzene	460°C	69	Available from Sigma-Aldrich
M 3	Trityl-3,4-bis(hexyloxy)benzene	600°C	65	Synthesis described in WO2012/177987
M. 4	4,4',4''-(ethane-1,1,1-triyl)tris((pentyloxy)benzene)	610°C	71	Synthesis described in WO2014/088898
C. M. 5	Butyl phenyl ether	210°C	0.1	Synthesis described in US20180148564

Recyclate verification

Patent number: US9708463

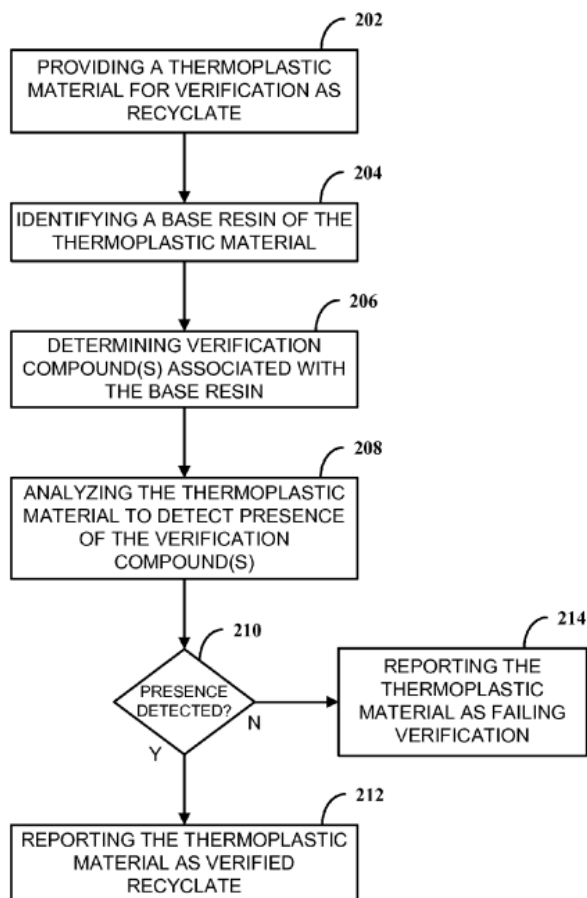
Publication date: 2017-07-18

Applicant(s): IBM

Inventor(s): HEBIG TRAVIS R; KUCZYNSKI JOSEPH; NICKEL STEVEN R

Summary

The present invention relates to a method and composition for verifying recyclate in thermoplastic materials, aimed at enhancing the recycling process. By incorporating one or more thermally stable verification compounds into a base resin, the method allows for the identification and verification of recycled content in thermoplastic materials. This is achieved through a systematic approach that includes identifying the base resin, determining suitable verification compounds, and analyzing the material for their presence. The advantages of this invention lie in its ability to provide a reliable verification mechanism that is less dependent on supply chain audits, thus facilitating the use of recycled plastics in various applications while maintaining the quality and integrity of the final products.



Method for producing a material with verifiable proportion of recycled material

Patent number: EP4493379

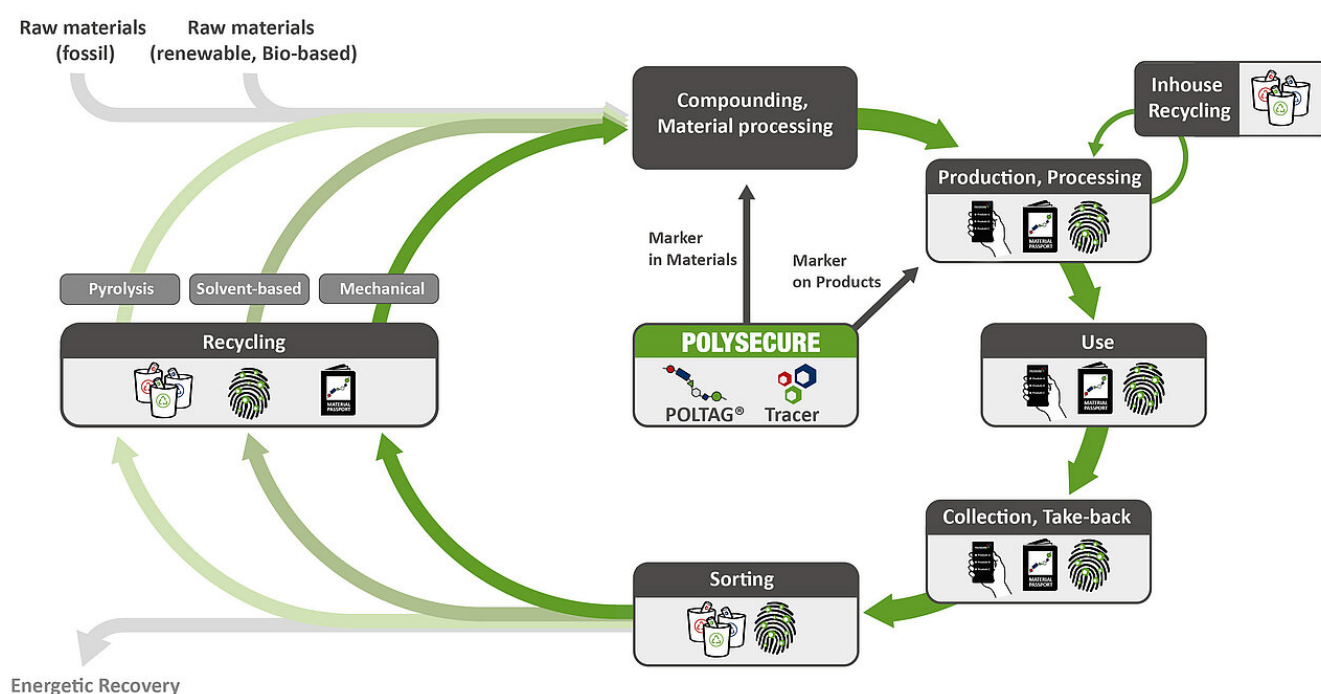
Publication date: 2025-01-22

Applicant(s): Polysecure GmbH

Inventor(s): KIRCHENBAUER DANIEL; MOESSLEIN JOCHEN

Summary

The invention provides a method for producing materials with a verifiable proportion of recycling material, addressing the need for reliable verification of recycled content in products. This method involves the use of a tracer, which can be a luminescent substance or a rare earth metal, to identify and quantify the recycling material. By adjusting the amount of tracer based on its signal intensity, the method ensures that the final material meets a predetermined target signal intensity, allowing for accurate verification of recycling proportions. This innovation not only enhances the recycling process but also contributes to sustainability by ensuring that products contain a specified amount of recycled material, thus facilitating better resource management and compliance with recycling standards.



Balancing of recyclable material amounts in product ecosystems

Patent number: WO2025108866

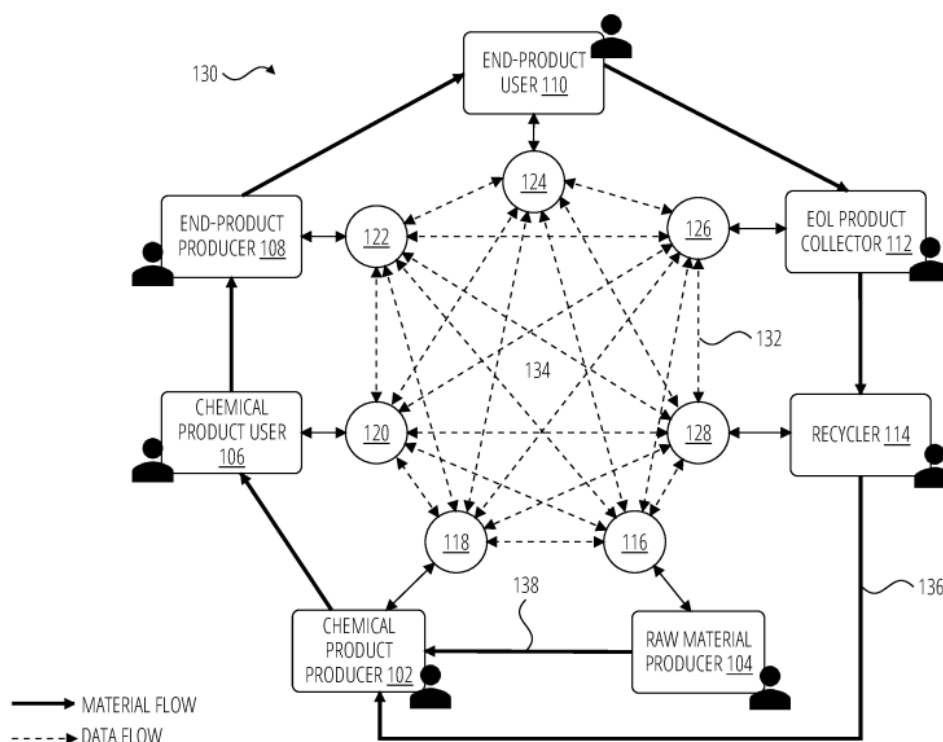
Publication date: 2025-05-30

Applicant(s): BASF SE

Inventor(s): SCHWABE HENNING; HAARDT DENNIS; LAUFER JONATHAN; MISHRA ARUNAV

Summary

The invention relates to a method and apparatus for effectively managing recyclable materials associated with material owners through virtual material accounts. By utilizing decentralized networks, the method gathers and aggregates data related to end products and their components, allowing for precise determination of recyclable material amounts. This innovative approach not only facilitates the allocation of these materials to virtual accounts but also enhances the transparency and accountability of recycling processes. The advantages include improved tracking of recycled content, enabling manufacturers to reduce their environmental footprint and promote sustainability. The system supports the circular economy by ensuring that recyclable materials are efficiently utilized in the production of new chemical products, thereby fostering a more sustainable production ecosystem.



Recyclable racket sports ball and method of recycling a mixed waste stream comprising said ball

Patent number: NL2028298

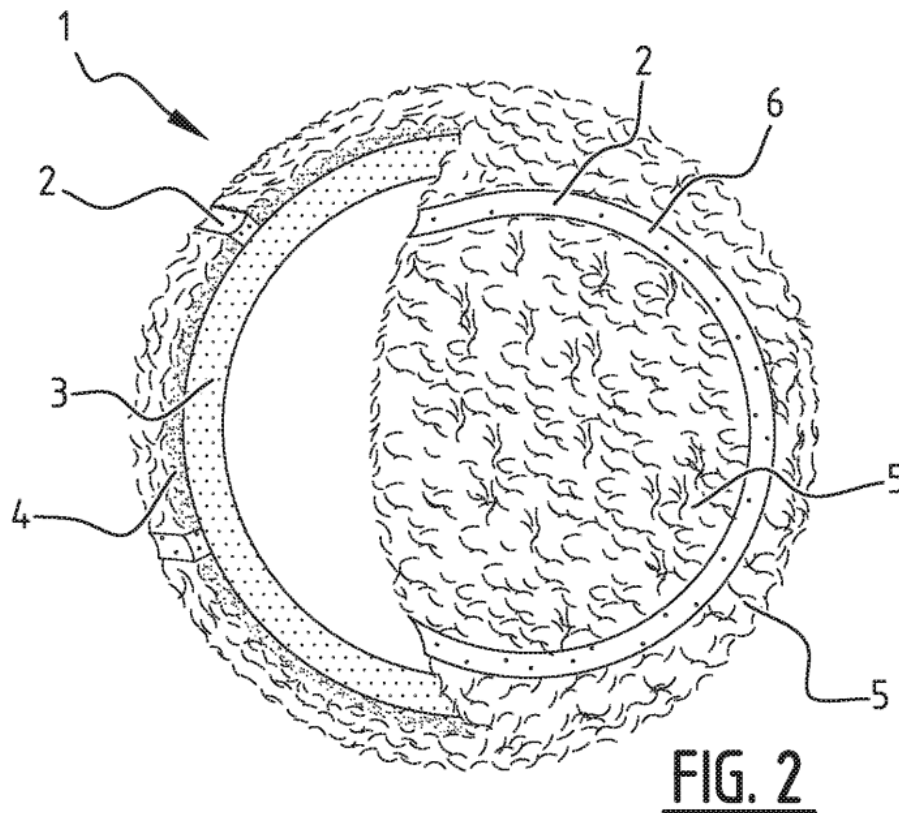
Publication date: 2022-12-08

Applicant(s): RENEWABALL B.V.

Inventor(s): ERIC PETERSEN

Summary

The invention provides a recyclable racket sports ball designed to facilitate efficient recycling through the incorporation of a marker substance that is distributed in a manner that allows for detection regardless of the ball's orientation in a mixed waste stream. This innovative design addresses the challenges faced in recycling sports balls, which often have standardized appearances but varied internal compositions. By utilizing a renewable polymeric composition for the core and a marker substance that can be detected via electromagnetic radiation, the invention enhances the speed and accuracy of recycling processes. The marker substance can include photoluminescent compounds and metal ions, ensuring that the recyclable material can be identified and separated effectively. This not only contributes to reducing environmental impact but also supports the creation of new products from recycled materials, thereby promoting sustainability in the sports industry.



Silicon nanostructures as luminescent markers for the recycling of plastic

Patent number: EP3870639

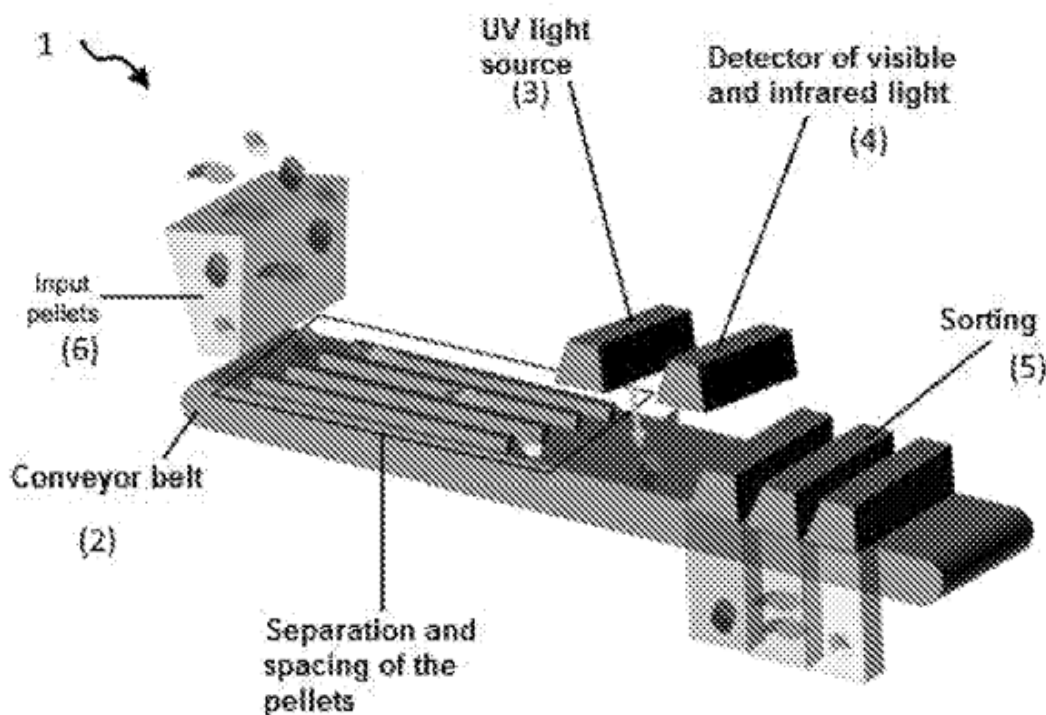
Publication date: 2021-09-01

Applicant(s): Alma Mater Studiorum - Università di Bologna

Inventor(s): CERONI PAOLA; ROMANO FRANCESCO

Summary

This invention provides a novel method and system for the separation of plastic materials, particularly aimed at recycling processes. By incorporating crystalline silicon nanostructures or silicon quantum dots into plastic matrices, the materials acquire luminescent properties that facilitate their identification and sorting. These nanostructures exhibit emission life spans ranging from 1 to 150 μ s and quantum yields between 1 and 100%, with emissions in the 400 to 1000 nm range. The method involves exciting the plastics with UV light and detecting the emitted signals to achieve effective separation. This approach not only improves the purity of recycled plastics but also addresses challenges associated with current separation technologies, such as autofluorescence interference and the presence of colorants. The use of low concentrations of these nanostructures ensures that the final products remain visually acceptable, particularly for applications in food packaging.



Recycling method and taggant for a recyclable product

Patent number: EP3768484

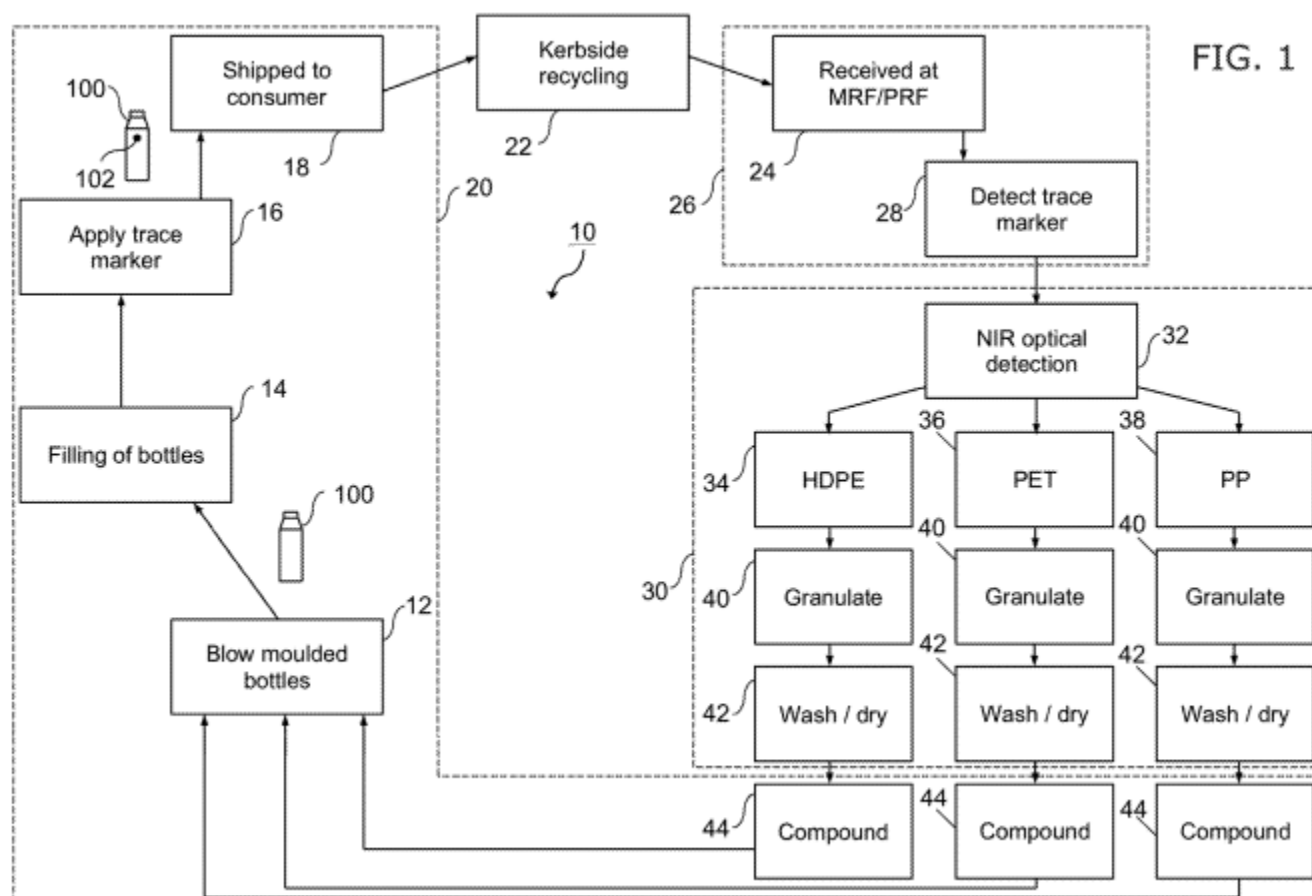
Publication date: 2021-01-27

Applicant(s): SUTTON PHILIP

Inventor(s): SUTTON PHILIP

Summary

This invention presents a novel method for recycling products through the application of unique machine readable taggant codes that facilitate tracking throughout the product lifecycle. By creating a trained database of digital images and associating each product with specific lifecycle data, manufacturers can efficiently recover materials for recycling. The method enhances the ability to separate recyclable materials based on their source, thereby promoting closed loop recycling and compliance with environmental standards. This approach not only improves resource efficiency but also aligns with corporate social responsibility initiatives, addressing the pressing challenges of single-use plastics and waste management.



Method and system for marking, tracking, grading and certifying plastics for enabling standardization and tokenization

Patent number: WO2025109603

Publication date: 2025-05-30

Applicant(s): SMX SECURITY MATTERS IRELAND LTD

Inventor(s): ALON HAGGAI; GREENBLATT JACOB

Summary

The disclosed technique presents a novel method and system for marking, tracking, grading, and certifying plastic materials, aimed at enhancing the sustainability of the plastic supply chain. By utilizing a chemical-based marker that encodes critical information such as ownership, polymer type, intended use, recycling loop count, and recycled content, the method allows for comprehensive tracking and utilization of plastics. This information is recorded on a distributed ledger or blockchain, ensuring transparency and accessibility for industry players. The system not only facilitates optimal allocation of recycled materials through AI-driven algorithms but also establishes a standardized grading system for plastics, promoting their reintegration into the supply chain. The approach addresses the pressing need for sustainability in plastic production and recycling, ultimately contributing to a circular economy.

