Multifunctional Biopolyester additive replacing PFAS and plastic in paper

Publieke samenvatting / Public summary

Aanleiding

Within the food packaging industry, there is a need for packaging material with specific properties like oil-based, liquid form, dry food, and hot beverages. Paper packaging could be a feasible option to replace harmful and polluting single-use plastic packaging. However, raw paper faces some inherent challenges, due to which it needs to be mixed with additives to be able to be used in food packaging and other applications. Therefore, current 'paper packaging' is often sized with and or coated with fossil-based, toxic, and non-biodegradable polymers: Up to 25% of paper consists of additives, used to enhance binding, water resistance, grease resistance, and printability. This makes this paper unsuitable to function as a safe and sustainable alternative to the SUP (Single-use plastic) packaging. These fossil-based additives are carcinogenic, mutagenic, and reprotoxic (CMR chemicals). Their persistence in food packaging is driving urgent demand for safe, biodegradable alternatives. For this, we need a multi-functional bio-based formulation that addresses Fiber Binding & Strength, Water & Grease Resistance, Printability & Surface Properties and Biodegradability & Safety.

Doelstelling

The project goal is to develop a multi-functional biobased, biodegradable and non-toxic additive to replace fossil-based synthetic paper additives. The project falls under the Biobased Circular theme of EKOO Part D3.2: Biobased Circular 3.2 Nieuwe generatie bouwstenen en biopolymeren. The project

Projectinformatie / Project information

Projectnummer / Project number
EKOOBBC25-03835024
Subsidiebedrag / Grant amount
€ 479.800,00

Algemene informatie / General information

Penvoerder / Secretariat
Sustanix Materialtech B.V.

Volg Topsector Energie op X / Follow Topsector Energie on X

@TSEnergie

aims to create novel bio-based polyesters to replace fossil-based synthetic and harmful additives in food contact paper packaging. We aim to use fatty acid polyesters with various biobased diols/polyols (polysaccharides such as starch, carrageenan, alginate, etc.) to mimic the properties provided by polyacrylates, latex, PFAS, as paper additives. The envisioned additive is both biodegradable and recyclable, supporting closed-loop material use in packaging. For scalability, the applicant makes use of industrially available byproducts from agriculture (biomass), readily available in the Netherlands and Europe. By maintaining compatibility with current product processes as well as recycling and manufacturing infrastructure, Sustanix enhances the feasibility of widespread commercial adoption, driving both sustainability and scalability in the packaging industry.

Korte omschrijving

The primary research objective is to study the interaction of the polysaccharide-fatty polyesters with paper pulp, which can retain the polymer in the bulk of the formulation when blended. To this end, this project is going to research two alternative routes to develop a water-based formulation from bio-polyesters: ? Route 1 (Sustanix): Starch-derived fatty polyester ? Route 2 (UM): carrageenan and alginate fatty-based polyesters The major challenge of such polymers would be creating their water-based formulation (Sustanix). These polymers developed in WP 1 and 2 can be used in combination with each other and/or other (bio)polymers or individuals to verify the effect of water and oil resistance at concentration and cost similar to PFAS. The most promising formulations will be scaled in WP 4 (UM and Sustanix) to allow for pilot-scale experiments at customers.

Resultaat

The project will result in a Proof-of-Principle of the developed multi-functional bio-based additive, which shows the formulation's potential to address: 1. Fibre Binding & Strength ? Replacing Styrene Butadiene latex and synthetic binders 2. Water & Grease Resistance ? Replacing acrylics and PFAS-

based chemicals 3. Printability & Surface Properties ? Enhancing smoothness, porosity, and adhesion 4. Biodegradability & Safety ? Ensuring no microplastics, toxic chemicals, or persistent pollutants This additive will be designed to complement Sustanix's existing bio-coating technology, enabling a fully bio-based and recyclable paper packaging solution. The new additive will seamlessly integrate with existing manufacturing lines and further strengthen the performance of bio-based coatings, allowing brands and paper manufacturers to meet sustainability targets without compromising performance.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.
Voor meer informatie over de Topsector Energie, ga naar **www.topsectorenergie.nl**.

Voor meer informatie over de TSE / Energie-Innovatie regelingen die RVO aanbiedt, ga naar **www.rvo.nl/tse**.