



# Multifunctional Sustainable Nanocoating's for Vegetables and Fruits Protection

# PROBLEM

**Globally 1.3 billion tons** food waste per year during processing and handling

- **Around 50 percent** of the food is lost during harvesting, post-harvest handling
- **31% of fresh tomatoes** bought by U.S. households are thrown out—that's 21 tomatoes a year per person! Over \$2.3 billion a year food waste





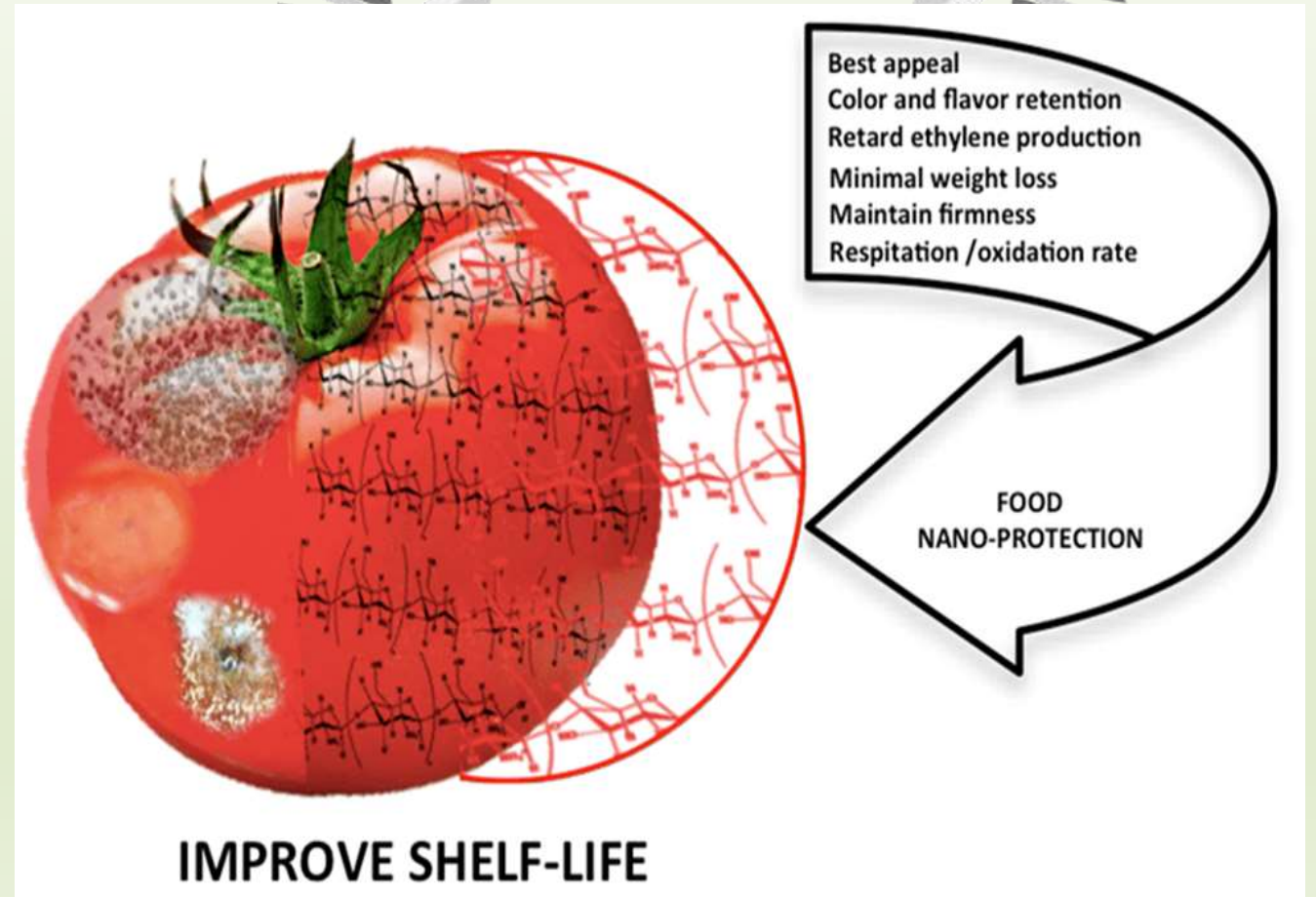
# PROBLEM

Food loss and waste is a major part of the impact of agriculture on climate change it amounts to 3.3 billion tons of CO<sub>2</sub> Emissions annually and other environmental issues, such as land use, water use and loss of biodiversity.



# Solution

Sustainable Nano-coatings  
based on plants by-products  
to protect postharvest fruits  
and vegetables





# Characteristics of Nanocoating

## 100% Natural

Made of plants by-products and naturally occurring organic compounds, our coatings are essentially food.

Consumer's demand

## Sustainable

Inherently biodegradable, our coatings remain effective throughout the supply chain, producing no by-waste.

## Ripening Inhibition

Ripening slow down the natural ripening process of fruits and vegetables

## Enduring Freshness

Our coatings provide natural-looking produce that stays fresh for much longer at ambient, cold and changing conditions.

## Global

We offer one coating for many varieties, which can be easily applied using simple techniques commonly used today.



## Economy

We would be 60 percent cheaper coatings than the current one.

## Ecology

Environmentally friendly technology: fast, does not use large energy resources. We would reduce the amount of waste produced by up to 65 percent.

# Impact

## Food

Directly affects the quality of food of the country's citizens

## Health

Health-.According to the World Health Organization (WHO), about 70 percent human health and longevity are determined by nutrition

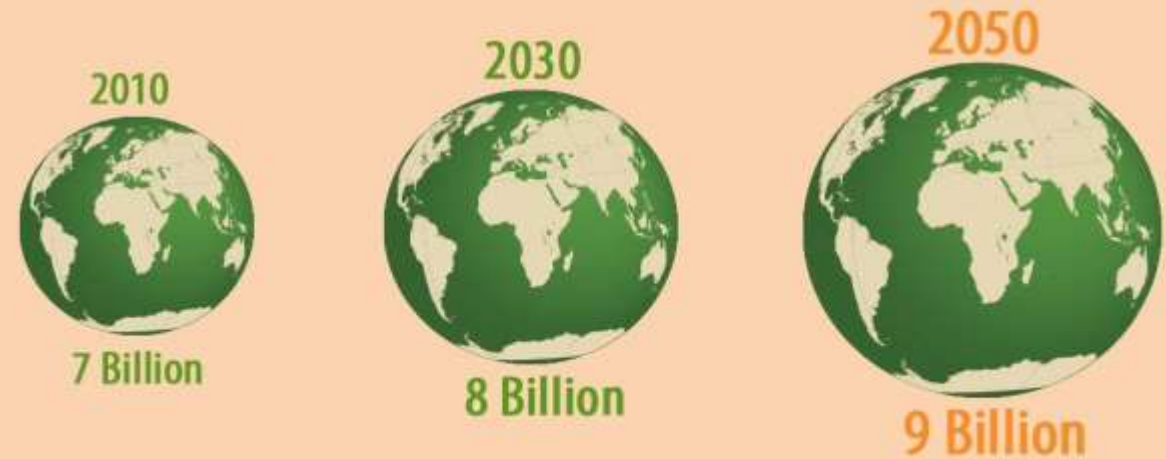




The European  
Green Deal

# Target

AGRICULTURE ALSO NEEDS TO PRODUCE  
**50%** MORE FOOD TO NUTRITIOUSLY  
FEED **9 BILLION BY 2050**



The European Union currently estimates its annual food waste to be **89 million tons**, and there is a predicted **40% increase over the next four years**. Reducing food waste by half by 2030 is one of the targets outlined in the **Sustainable Development Goals (SDG)**.



# TEAM AND COLLABORATORS

## Dr. Aistė Balčiūnaitienė CEO

13 years Innovator  
Author and creator of the idea  
Fields of science - Technological sciences. Materials engineering, Chemical engineering, Nano technologies

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## Dr. Jonas Viškelis CTO

Field of science - Agronomic sciences;  
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## Agnius Balčiūnaitis

**Economist,  
international trade**

> 17 years old Business development strategies, marketing, business planning, ISO standardization, CE, FDA. Introduction of new products; Budget and cost planning; Business relations with most EU countries.

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**LITHUANIAN  
RESEARCH CENTRE  
FOR AGRICULTURE  
AND FORESTRY**





# Competition

Only **16 patents** regarding nano-emulsion edible coatings and films with either antifungal, antibacterial, or antioxidant properties for application on fruits and vegetables.

## Market Players Covered

Bayer AG (Germany), H.C. Starck GmbH (Germany), AGC SEIMI CHEMICAL CO., LTD. (Japan), BASF SE (Germany), DuPont (US), Merck & Co., Inc. (US), Evonik Industries AG (Germany), Akorn (USA) - however, chemicals are used in the

## Opportunities

- Innovative products such as edible packaging and water-soluble packaging are fueling the market for eco-friendly food packaging;
- Rising health awareness as well as shift to healthy products;
- Stringent government regulations, packaging industry downsizing, and technological advancements.



# Technology / IP



## Innovative Synthesis



## Environmental Friendly

No chemical or synthetic reagents are used.



## Competitive

During the synthesis, extremely small amounts of energy are used. The reaction takes place at room temperature.



## Economical

Extraction of functional properties green synthesis has no analogues in the market. The lowest price is obtained.



## Sustainable

By-products of processing are used.

An interdisciplinary product combining technological areas:

- Materials engineering
- Chemical Engineering (Biochemistry, Chemistry, Biology and Botany)
- Food engineering
- Environmental engineering

**Our IP portfolio includes one world granted and two EU provisional patents.**



# Market Potential

The global nanocoating market size was estimated at **USD 14.18 billion in 2023** and is expected to surpass around **USD 66.35 billion** by the end of **2032** registering growth at a **compound annual growth** rate (CAGR) of 18.7% from 2023 to 2032.



Source: [www.precedenceresearch.com](http://www.precedenceresearch.com)



# BUSINESS MODEL



✓ PRODUCTION

✓ LICENSING



Prototype and production  
development, preparation for  
commercialization  
(standards, ISO..)



Business sales  
and licensing



Open Trade

International projects and  
capital raising

Agriculture companies,  
food business

2023-2025 m.

2025-2028 m.

