

DEVELOPMENT OF ACTIVE FOOD PACKAGING FROM SUSTAINABLE RESOURCES. ET1ALPACA

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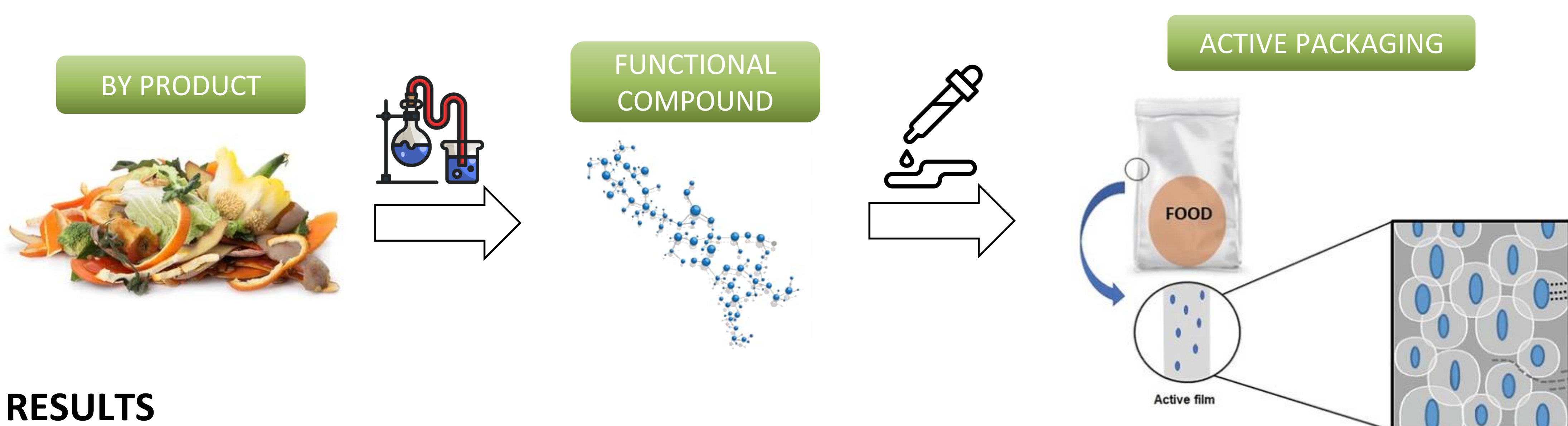
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INTRODUCTION

The widespread use of fossil-based plastics in food packaging has become a serious environmental issue, especially in Europe, where the sector leads in single-use plastic consumption. These materials, slow to degrade, contribute to pollution, biodiversity loss, and microplastic accumulation. As natural resources are depleted beyond their renewal capacity, there is increasing global momentum to shift toward a circular economy that prioritizes waste reduction and resource reuse. Bioplastics materials that are bio-based, biodegradable, or both offer a promising alternative to conventional plastics, their use in industrial food packaging applications remains limited due to challenges in large-scale production, performance optimization, and cost-efficiency. At the same time, the packaging industry is increasingly demanding solutions that not only reduce environmental impact but also extend the shelf life of food products. This demand has driven the emergence of active packaging systems, which incorporate bioactive substances to preserve food quality and safety. In this context, the ET1ALPACA project aims to obtain bioplastic-based food packaging incorporating bioactive compounds extracted from agri-food by-products using green extraction technologies. These packaging materials are designed to extend the shelf life of food products by providing functional properties such as antioxidant, antimicrobial, gas barrier, and light-filtering activity. Through this approach, the project seeks to develop innovative, scalable, and environmentally friendly solutions that reduce plastic waste, promote the valorization of agricultural residues, and support a more sustainable food system.

OBJECTIVES

- ❑ Valorize agri-food by-products particularly those from algae, fruit and vegetable processing, and the horticultural sector for the development of active food packaging materials.
- ❑ Create natural active substances with functional properties, including gas barrier, antioxidant, antimicrobial, and light-filtering capabilities..
- ❑ Validate the performance of the newly developed packaging in specific food applications, comparing it to conventional packaging systems.



EXPECTED RESULTS

- ✓ Implementation of green extraction technologies for the recovery of bioactive compounds from by-products, enabling their use as natural additives in packaging materials.
- ✓ Formulation of active packaging prototypes with comparable performance to conventional plastics, specifically tailored to extend the shelf life of selected food products like olive oil, cut apples, and paprika.
- ✓ Industrial-scale processing strategies validated for the production of active packaging materials using bioplastics and functional compounds.
- ✓ Demonstrated effectiveness of the new packaging in preserving food quality and safety, with improved barrier and antimicrobial properties, and verified performance in real food applications.

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