MANDALA

The transition of MultilAyer/multipolymer packagiNg into more sustainable multilayer/single polymer products for the fooD and phArma sectors through the deveLopment of innovative functional Adhesives

Summary

Plastic recycling is a major technological challenge. Currently, only 14 per cent is recycled, with 72 per cent simply not recovered at all. Despite having an inherent value, virtually all – 95 per cent – is simply lost after a single use. Clearly, if Europe's ambitions for a circular economy are to become a reality, this must change dramatically.

To address this challenge, the European Commission has defined a 'European Strategy for Plastics in a Circular Economy'. However, implementation faces some issues. A major challenge is that, in order to improve performance, the packaging is becoming increasingly complex, often incorporating mixed materials that make it difficult to recycle.

The solution to this is twofold. First, to create mono-material packaging that offers the same benefits as existing, multi-material approaches. Second, to develop technologies that make it easier to separate and sort multi-material packaging. This is what the MANDALA project aims to deliver; an innovative adhesive for multilayer products that provides sustainable solutions for addressing eco-design, dual functionality and end-of-life based on bio-based multilayer mono-material film packaging with functionalities that compete with existing films.

Type of Action: Research & Innovation Action

Value Chain: VC4 – organic waste

Start date: 01 June 2019

End date: 31 December 2022

BBI JU contribution: € 3,650,921.75

Objectives

The overall objective of the MANDALA project is to demonstrate the feasibility of its multilayer packaging as part of the circular economy. Within this, it seeks to deliver specific objectives. It will:

- Stimulate an effective after-use plastics economy by helping make the economics of recycling more attractive.
- Decouple plastics from fossil feedstocks by identifying and determining renewably-sourced alternatives.
- Make the end-of-life phase for packaging more sustainable by developing a new laminated film approach that is easy to separate and thus recycle. It will also develop the technologies to enable separation of the different materials after use.
- Enhance available biological waste treatment processes. Currently, European

Expected impacts

The MANDALA project sets out to deliver a number of impacts. It seeks to:

- Create three new interconnections in the bio-based economy; between the recycling sector and food and pharmaceutical end-users; the recycling, plastics and biodegradable and composting sectors and food and pharmaceutical end-users.
- Contribute to creating a new value chain; the "Circular VC" connecting the chemicals, packaging and waste management value chains.
- Set the basis for two new consumer products, specifically flexible films. These will be used for wrapping meat and ready-to-eat foods and for making blister packs for pharmaceuticals.
- Realise an advance in Technology Readiness Level (TRL) for delamination

systems do have a well-developed composting infrastructure; the MANDALA project will help develop a model for isolating the biodegradable elements from the recyclable ones.
- Allow the separation and re-routing of materials through eco-design using the MANDALA project's multifunctional adhesive. This will allow multi-layer packaging to be split into its component parts without using solvents.

technology from TRL3 to TRL5.
- Reduce the environmental footprint by at least 30 per cent. Using recycled polymers will save up to 87 per cent (11 million tonnes of CO2e), while enhanced delamination technology (CADEL) reduces CO2e by 35 per cent over benchmarks.
- Contribute to three KETs (Key Enabling Technologies), namely advanced materials, biotechnology and nanotechnology
- Delivery employment opportunities, creating 20 direct and around 1800 indirect jobs.

Consortium

- Fundación AITIIP (Spain)
- Agencia Estatal Consejo Superior de Investigaciones Científicas (Spain)
- Società Azionaria per l'Industria Chimica Italiana Sapici SPA (Italy)
- Repsol SA (Spain)
- Bio-Mi Drustvo S Ogranicenom Odgovornoscu Za Proizvodnju, Istrazivanjei Razvoj (Croatia)
- Norner Research AS (Norway)
- Gaviplas SL (Spain)
- Cadel Deinking SL (Spain)
- Asociación Cluster Food+I (Spain)
- Asociación para la Investigación Desarrollo e Innovación del Sector Agroalimentario – AIDISA - CTIC-CITA (Spain)
- Tsatsos Georgios Cosmetic (Greece)
- Laboratori Archa SRL (Italy)

Project coordination

Organisation name: Fundación AITIIP (Spain)