

Gum-rosin-based polymers for industrial applications

Driven by the world quest for biobased and environmental-friendly packaging solutions, an international consortium promoted under the EUROSTARS HORIZON 2020 Programme and formed by United Resins (UR – Lavos, Portugal), United Biopolymers (UB – Lavos, Portugal), Tecnopackaging (TP – Zaragoza, Spain), and Eversia (EVE – Murcia, Spain) intends to develop, demonstrate, and introduce into the market two novel biopolymers for industrial applications based on gum rosin derivatives. Being approved by the European Commission's Eurostars Programme under Reference Number 114728, *DDIBIORESIN* – Development and demonstration of innovative bio-resin-based polymers for industrial applications, combines four partners representing the complete supply chain for the manufacture and commercialization of the final products and targets a complete portfolio of biobased polymers for both flexible and semi-rigid applications. UR is the coordinator of the project and is a leading producer of gum rosin derivatives and counts on extensive experience in managing projects related to the development of technical solutions and products for the bioplastic industry. The knowledge brought by UR and UB was essential in raw material selection and bioplastics production, while the stated experience of industrial partners was crucial for the manufacturing processes and optimized conversion of such materials.

The project establishes two different lines of marketable food packaging products and targets the manufacture of three different end users' products: bioplastic films or bags; trays and a combined product featuring flexible and rigid solutions (i.e. tray with film sealing).

These novel biopolymers based on natural rosin derivatives are intended to improve some technical specifications and overcome some limitations with respect to the most common biobased commercial solutions. The addition of gum rosin derivatives enhances the melt flow index resulting in injection moulded materials with improved processability, allowing the reduction of the processing temperatures and consequently process energy consumption. Gum rosin it's a natural based material could also be used to increase the biobased carbon content if used in combination with conventional fossil-based plastics. Its antibacterial and highly hydrophobic character strongly impacts the water vapour permeability of bioplastics films, reaching values of less than 100 g/m²/day (at 25°C, 75 % r.h.) in the case of 15 µm films. Gum rosins are commercially compatible additives as they tend to have a lower price than PLA or PBAT which they are combined with. Preliminary results show that the incorporation of the resin affects the disintegration rate (slowing it down) and allows to control the biodegradability of these materials under composting conditions.

After almost two years of research and development, prototyping and industrial optimization the results are very optimistic. The process leads to the generation and acquisition of new knowledge regarding the usage and adaptation of natural based gum rosin derivatives to be incorporated into conventional compostable polymers such as PLA, PBAT, or starch blends. The resultant materials are then converted by means of injection moulding, thermoforming, and blown film extrusion. Presented by the name CoRez®-P2 to – P6, those materials are now under a final validation step and expect to be commercially available soon. **AT**

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