

Biopolymers Made from Coffee Grounds

Recycled Coffee Grounds, from Waste to New Life



The Giardinone Cooperativa Sociale, a social collective based in Milan, Italy, handles competence and creativity in the design and maintenance of greenery. As part of its mission, it was looking to create a circular economy with disposed coffee grounds as a zero-waste alternative to traditional plastics.

Bear Plast, an Italian injection moulder and provider of plastics solutions, enlisted the assistance of long-term partner, Nevicolor, a European leader in tailor-made compounds, to develop a biobased polymer that could meet Il Giardinone specifications. Nevicolor is a technical expert in the field of thermoplastic granules and powders production in Italy and has a history of developing recycled pellets from previously consumed industrial wastes.

Nevicolor, in collaboration with Bear Plast, enabled the development of a made-in-Italy biobased material composed of biopolymers and recycled coffee grounds of industrial origin named Coffeefrom® by Il Giardinone Cooperativa Sociale, with the support of a commissioned research carried out by the Chemistry Department of Politecnico di Milano. Being organic waste, coffee grounds represented an innovation within the compounding process. Due to the physical characteristics, Nevicolor conducted trial-and-error tests to find the right extruder and screw design. The research and design team at Nevicolor also tested the handling of the coffee powder so that the production run was consistent. During the moulding tests, partners minimized the thermal stress due to the high temperatures on coffee wastes by choosing the best press option and plasticizing cylinder.

PROJECT AT-A-GLANCE

Recorded Benefits

The final product represents the ultimate zero-waste alternative:

- Durable and break-proof cups
- FCM certified (food contact safe)
- BPA-free
- Natural color from coffee grounds
- Dishwasher friendly with low temperatures and eco-mode setting, up to 50° C

Challenge

To develop biobased material with industrial waste coffee grounds.

Solution

Nevicolor helped discover the right extruder, screw design and handling process of the coffee powder to ensure a consistent production run.

Result

A biobased polymer material made partially from recycled coffee grounds.

As a result, the team developed Coffeefrom® — a biobased polymer that can be used in many applications including cups, automotive, food packaging, tableware and more. Coffeefrom® is made of polylactic acid (PLA), non-fossil biopolymer, plus 10% industrial coffee waste. The material was used to develop the first Coffeefrom® product, a refined coffee set composed of cup and saucer, supporting CO₂ emissions reduction in the overall processing cycle of coffee grounds, which are usually disposed in the landfill and are responsible for high management and logistics costs. To achieve a fully sustainable supply chain, it would be conducive if the coffee wastes were dried near a compounding plant.

Currently, Coffeefrom®-PLA material cannot withstand high temperatures, especially inside a dishwasher; for this reason, the team is developing other compounds to help overcome the functional limits of PLA. By developing additional compounds, Coffeefrom® materials could meet many applications needs and become more sustainable by adding greater quantities of coffee wastes.



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