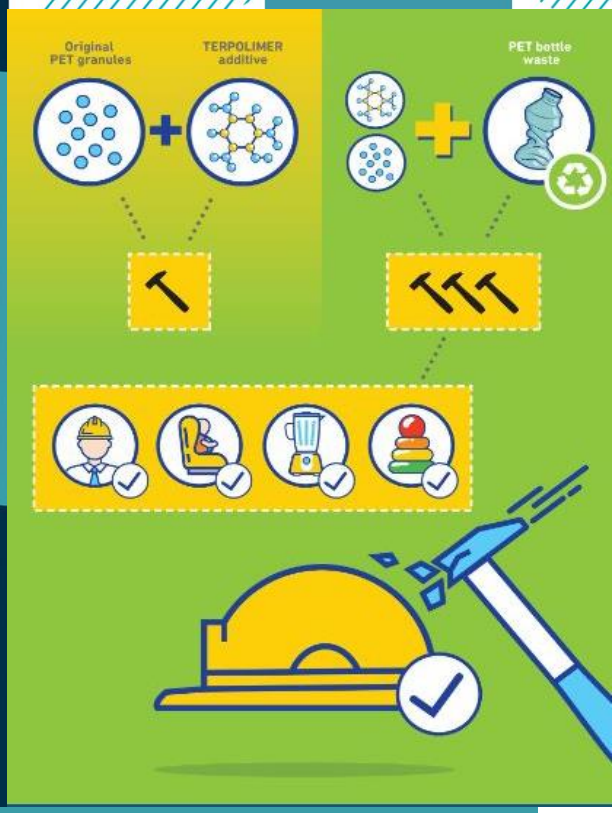
Budapest University of Technology and Economics

PROCESS TO MANUFACTURE LOW-GRADE POLYESTER WASTE INTO STRONG PLASTIC

MANUFACTURING ECO-FRIENDLY, HIGHLY IMPACT-RESISTANT POLYESTER PRODUCTS FROM HIGHLY DEGRADED SECONDARY FRACTIONS



Bulk recycling of inhomogeneous PET or other thermoplastic polyester waste (either selectively collected municipal waste, industrial waste, or marine waste) is a major challenge. During the recycling process, the material becomes brittle, thus limiting its potential uses. Production of plastics with advantageous properties from recycled PET (or other polyesters such as PLA) is therefore particularly desirable in light of the higher cost factor of using other virgin feedstock.

SOLUTION

We developed a novel process where the polyester (e.g. PET) fraction of low-grade waste contributes to a significant increase in impact resistance of the recycled product (exceeding that of ABS, HDPE or PA6, i.e. 30-50 kJ/m2). The process results in a ca. 20% cost reduction, as a less reactive toughening agent is needed.

The key finding is that the efficacy of the reactive impact modifier is increased as a result of the increased mobility and reactivity of low-molecular-weight polymer chains in waste PET fractions. The technology is therefore suitable for processing PET in continuous operation and with high yields, in ways that previously were not viable, such as injection moulding or 3D printing.

This may be successfully exploited in other polymeric systems, such as in PBT or PLA matrix, and/or in combination with other reactive modifiers as well.

TRL 6 Technology demonstrated in relevant environment

SEEKING

one or more licensees in the field of manufacturing of

- secondary raw materials, or
- moulded products from plastic where impact resistance is key (for the production of standalone products or components of complex products).

BENEFITS

- High impact resistance of end product;
- Recycling of degraded PET waste;
- 50% less terpolymer additive needed;
- Cost-effective production;
- New method for PET/PLA processing;
- Positive impact on the environment.

APPLICATION

- Secondary raw materials;
- Recycled plastic products with bespoke properties, e.g.
  - protective gear (helmets, shields),
  - child safety products (carriers, seats),
  - construction toys,
  - electronic device housing

PUBLICATIONS

György MAROSI, Katalin BOCZ et al.: Application of low-grade recyclate to enhance reactive toughening of poly(ethylene terephthalate), Polymer Degradation and Stability, Volume 185, 2021.

Á. Mihályfi; L. Helmajer; Z. Lovas; K. Bordácsné Bocz; F. Ronkay; B. Molnár; G. Marosi. Thermoplastic Polyester and Production Process thereof, 2021 (only in Hungarian).

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INTELLECTUAL PROPERTY

Priority HU patent application P2000393 (filed on 24 November 2020)

PCT application: HU2021-050064 (filed on 24 of November, 2021)

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