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# PROSPECTS OF RECYCLING POLYETHYLENE TEREPHTHALATE WASTE INTO CONSUMABLES FOR 3D-PRINTERS

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Finding ways to dispose of solid waste is one of the tasks that many scientists around the world are working on. The emergence and development of new industries, rapid population growth as a result of rising consumption, all this leads to an increase in waste that poses a danger to the environment. In recent years, the level of production and consumption of polymeric materials has increased. Most of the manufactured products are packing containers. For example, every second in the world produce 20 thousand bottles of polyethylene terephthalate and buy every minute about 1 million. According to forecasts, in 2021 this number will increase by about 20%.

Polyethylene terephthalate (PET) is a thermoplastic polyester used in the production of synthetic fibers, film and plastic packaging [1]. With a market share of 18% of all manufactured plastic materials, it ranks third after polyethylene (33,5%) and polypropylene (19,5%). PET is known to the world under other names - mylar, thermoplastic or polyester.

Polyester is one of the most common and modern materials used to create synthetic fabrics of various types [2].

The scope of PET in the world is distributed approximately as follows: about 70% of plastic goes to the production of threads and fibers (polyester), about 30% - to plastic bottles.

Polyethylene terephthalate wastes are practically non-degradable wastes. The processing of this type of waste is still underdeveloped, and its utilization, including incineration or storage in landfills causes significant damage to the environment.

Currently, only 12% of polymeric materials used in the manufacture of clothing are recycled worldwide, so textile recycling has very serious grounds. However, some existing mechanical technologies have proved ineffective, and certain reusable fabrics are usually converted into substandard products, such as

gaskets, insulators or rags. Therefore, the question arises of developing new technologies for recycling light industry waste.

The use of new technologies is the main trend of recent years in any field of industrial production. Every company in the world strives to create cheaper, reliable and high-quality products using the most advanced methods and materials.

Recycling technologies for plastic bottles are profitable and environmentally friendly. They reduce the need for primary raw materials, save labor, reduce the consumption of 50-60% of the energy that would be needed to produce a product from primary materials, contribute to further environmental protection and improve the existing environmental situation, reduce greenhouse gas emissions.

Today, PET is the most widely recycled plastic. An important area of application of secondary PET is the production of textiles. PET fiber, formed from secondary polyethylene terephthalate, has mechanical properties that meet the conditions of production of a wide range of products - textiles, fabrics for clothing and carpets for residential and office premises, car upholstery and more. Secondary PET can be used to make fibers and rods for the production of brushes and brooms. Based on it, using various fillers, additives, plasticizers, it is possible to produce new polymeric materials with high sound, heat insulation, adhesive, adsorption properties, large specific surface area, ductility, resistance to chemical and atmospheric influences, environmental friendliness. An example is the manufacture of abrasive materials - for this abrasive is mixed with crushed PET material and fed to the extruder. A new material with new properties is obtaining.

So we can conclude that the problem of recycling PET waste is relevant for the whole world community, so it must be solved by joint efforts based on research and advanced technologies.

One way to recycle plastics is to use recycled polyethylene terephthalate waste, in particular PET bottles and light industry textile waste, into consumables for 3D printers. The use of additive technologies is one of the most striking examples of how new developments and equipment can significantly improve traditional production.

## References

1. What is PET and what is it served in [Electronic resource] – Access mode: http://plast.guru/page720240.html (date of application: 21.10.2021).

2. Polyester [Electronic resource] – Access mode: http://plast.guru/page720240.html (date of application: 21.10.2021).