

of carboxyl chemical linkages in backbone main chains. The destruction of carbon-hydrogen chemical bond in low-molecular PLLA fibers results in loss of molecular weight after treatment with doses higher than 25 kGy. After the process of degradation in PBS, scaffolds show the same tendency to lose molar mass. As a result, scaffolds degradation after irradiation of pulsed e-beam occurs faster than without modification.

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In conclusion, pulsed e-beam treatment of PLLA scaffolds has a significant influence on its physical and chemical properties. E-beam irradiation leads to the decreasing of molecular weight and could be considered as a potential technology to control degradation rate of nonwoven scaffolds. Furthermore, pseudo-surface erosion after irradiation will help to avoid acid autocatalysis phenomenon.

ON THE WAY TO HIGHLY EMISSIVE MATERIALS: INCREASING RIGIDITY BY INTRODUCTION OF FURAN MOIETY IN Co-OLIGOMERS

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Linear co-oligomers combining high luminescence efficiency and semiconducting properties are of great interest for organic optoelectronics¹. Single crystals of alternating furan/(BPFb)² or thiophene/phenylene (BPTB)³ co-oligomers (Figure 1a) demonstrated a promising combination of high charge mobility and high luminescence efficiency, BPFb outperforming its thiophene analogue. However the nature of these differences was poorly understood.

In this study we explored intramolecular factors affecting the optoelectronic properties of furan/ and thiophene/phenylene co-oligomers³. We demonstrated that BPFb exhibits almost twice higher (Figure 1b) torsional rigidity than BPTB solely due to more efficient conjugation. The increase of rigidity of BPFb with respect to BPTB was shown to facilitate hole, electron and exciton transfers. The higher rigidity of BPFb was also suggested to hinder one of the possible luminescence quenching pathways.

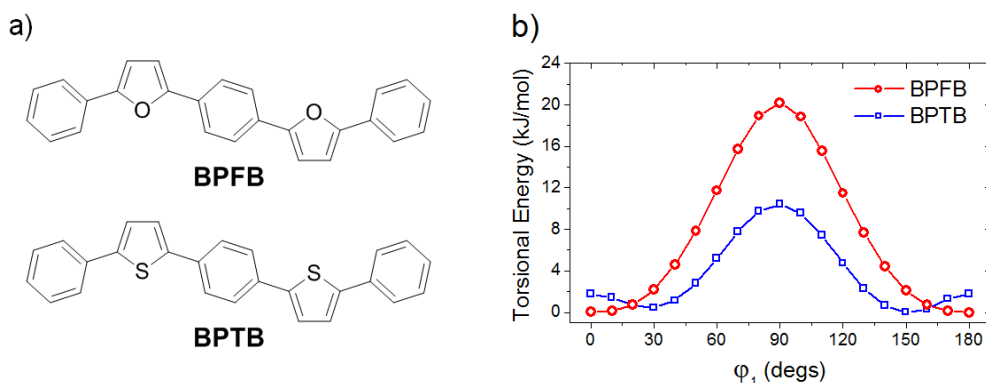


Fig. 1. (a) structures of studied compounds; (b) relaxed scans of the ground state PES of BPFb (red circles) and BPTB (blue squares)

Therefore, tuning of torsional rigidity greatly impacts on emission and charge transport properties,

being a very powerful tool on the way to high performance emissive organic semiconductors.

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CHEMICAL RECYCLING OF POLYMER WASTES BASED ON POLYLACTIDE

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Plastic recycling is strategically important issue in many countries. Russia is not an exception. The 21st century, certainly, can be called the century of plastic, because there is a great number of different products, which are made from this lightweight, durable, and relatively cheap material. The manufacture of products based on polymers and capable of decomposition by microorganisms is currently being developed. However, biodegradable plastic is rather expensive. So, the best options are recycling of polymer wastes and reuse of these materials. Obtaining monomers from polymer wastes is a pressing challenge nowadays [1].

Poly lactide (PLA) is the linear aliphatic polyester, the monomer of which is lactic acid. It represents thermoplastic, transparent, and colorless polymer. The reasons of its extensive use are such properties as biodegradability and biocompatibility. Polylactide is used for production of different films and covers, for 3D printing and in medicine [2]. The process of obtaining lactide is multistage and energy-intensive, which predetermines the low yield of the product, significant loss of lactide during its purification, the formation of a large amount of waste, the high cost of the polymer. This situation could be improved by the recycling of substandard waste based on PLA. This type of polymer can be

easily subjected to recycling, in particular, chemical one [3], where the low-molecular fractions (lactic acid and lactide) are produced as a result of polymer chain destruction.

The aim of this work was to obtain lactide by thermocatalytic depolymerization of polymer wastes based on polylactide.

The objects of research were commodity polylactide and polylactide with inorganic pigments, namely, with Fe₂O₃ and TiO₂. The process of obtaining raw-lactide was conducted over 30 minutes on the laboratory set up for the vacuum distillation at the temperature of 250 °C and the pressure of 10 mbars in the presence of the catalyst ZnO. The purification of raw-lactide was held twice by the method of recrystallization from ethanol. The identification of the product was carried out by the method of IR-spectroscopy. The effectiveness of the process was evaluated by the yield of raw-lactide and pure lactide and the purity of the monomer was assessed by its melting point.

The research showed that polymer blends could be subjected to destruction as easily as commodity polylactide, with the formation of monomer 3,6-dimethyl-1,4-dioxan-2,5-dion (or lactide). The material balance of the process was compiled (Table 1). It showed that the yield of commodity polylactide

Table 1. Influence of polymer blend composition on the yield of raw-lactide (β_{r-l}), gas products (β_{gp}), and pitch (β_p)

Polymer blend	β_{r-l} , %	β_{gp} , %	β_p , %
PLA	82.63±8.13	3.97±1.61	13.40±6.52
PLA+Fe ₂ O ₃	66.57±31.79	2.43±2.16	30.99±30.80
PLA+TiO ₂	90.84±10.74	2.44±1.36	6.72±10.43