quality of the final product [1]. Therefore, it has been hypothesized that for the normal work mode of the sulfonation with sulfuric anhydride in the reactor, which contain a high content of by-product aromatic components in the feedstock, it is necessary to increase the sulfur feed to combustion. It can help to enlarge the sulfuric anhydride concentration in the sulfonation reactor. This assumption is confirmed by an analysis of the production data presented in Fig. 1:

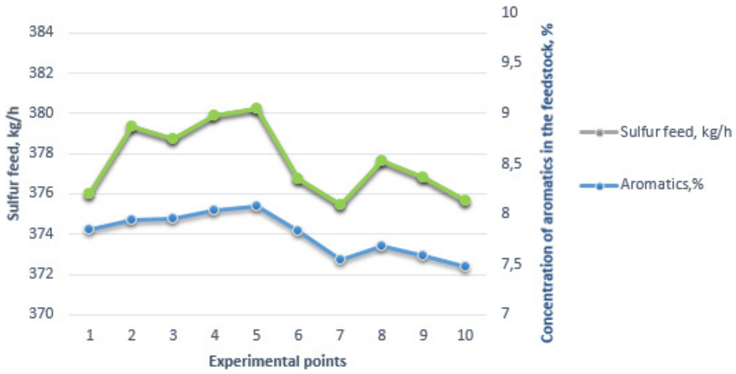

Fig. 1. *Dynamics of the change in sulfur supply for combustion from the content of aromatic compounds in raw materials*

Then, the optimum values of sulfur were calculated with using the mathematical model. The optimum values are directly connected to the concentration of aromatic compounds in the raw materials. LABSA yield constantly maintains on a high level (Fig. 2).

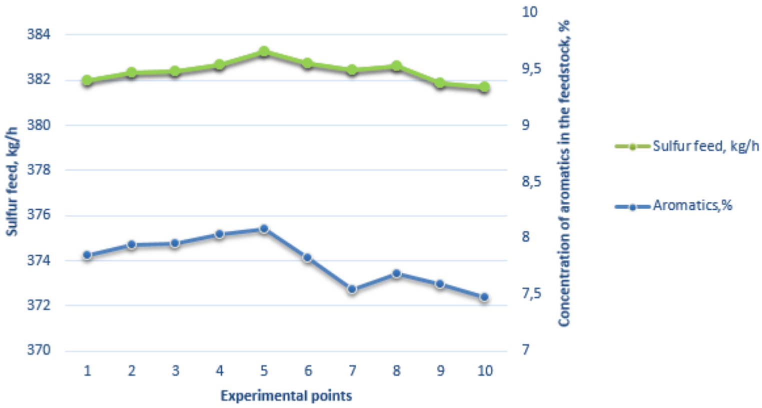

Fig. 2. *Dynamics of the change in the optimal sulfur supply for combustion from the content of aromatic compounds in raw materials*

It is established that the obtained data on the optimal sulfur consumption allow to increase the LABSA content in the product stream by 1–0.5 %.

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TWO-LAYER HIGH-EFFICIENCY OLED-STRUCTURES BASED ON NEW POLYFLUORENES

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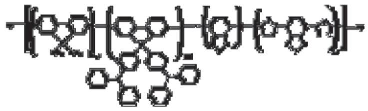
Polyfluorene is widely used as the main material for creating blue LEDs [1]. For the production of red LEDs, in particular, iridium complexes with organic ligands are used [2]. Because iridium is a rare metal, the light-emitting devices produced on its basis have a high cost. To solve this problem, it was proposed to use polyfluorene derivatives, the maximum radiation of which falls on the red and green regions.

The main of this work was to create high-efficiency light-emitting devices based on polyfluorene derivatives. To do this, it was necessary to make an OLED structure, measure its electroluminescent and geometric characteristics.

The study used polyfluorene derivatives synthesized in the laboratory of polymer nanomate-

Table 1. Used polymers

Symbol	Fluorescence Color	Chemical structure
RI-1	Red	
RI-2	Red	
BI-4	Blue	
BI-5	Green	

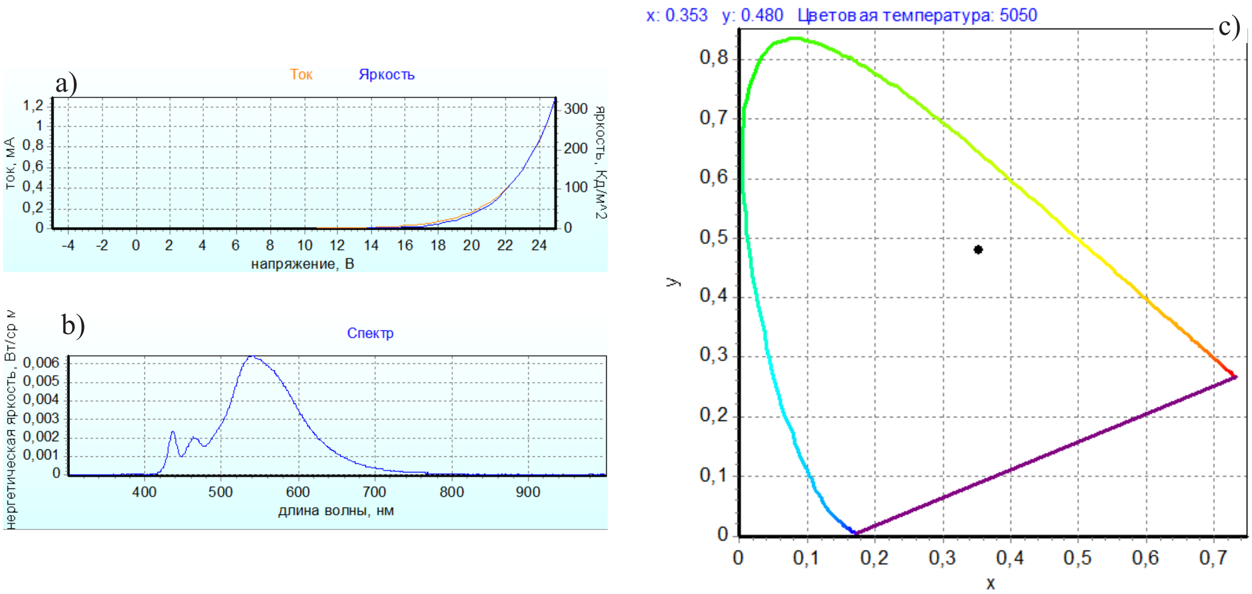


Fig. 1. *I–V and I–L curves (a), electroluminescence spectrum (b) and color coordinates (c) of a two-layer thick-film OLED, created on the basis of BI-5 and PFPO*

rials and compositions for optical media Institute of Macromolecular Compounds of RAS, St. Petersburg. All polymer samples contain triphenylamine-containing monomer (25 mole%) residues – the hole-transport component. A monomer containing a phosphoric acid residue is incorporated into most copolymers. The task of this monomer is to increase the injection of electrons. A polymer containing residues of only this monomer, PFPO, was also used.

OLED-structures were made, of different configuration and thickness of layers. The anode was ITO on a glass substrate. The electroconductive layer PEDOT: PSS and the emitting layers of polyfluorenes were applied by spin-coating from solutions. Different types of cathodes were used, deposition was carried out by thermovacuum evaporation.

As a result, close results were obtained for thin- and thick-film devices with sufficiently high efficiency (up to three Kd/A at a supplied voltage of 15 V) and high stability.

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THIN CHITOSAN FILMS FOR APPLICATION IN PHOTODYNAMIC THERAPY

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Photodynamic therapy (PDT) is an effective treatment for human premalignant and malignant lesions because it is non-invasive, well tolerated by patients and can be performed repeatedly without cumulative side effects [1]. Chitosan crosslinked tannic acid films have been prepared to load the photosensitizer 5-aminolevulinic acid (5-ALA) to improve its outcome in PDT. The 50 µm thick film is biocompatible and biodegradable and it dissolves in physiological condition in under 24 h [2]. The surface morphology and the porosity allow an optimal 5-ALA release pattern with a pH-dependent rate.

In vitro tests on HeLa cells demonstrate an increase in phototoxicity, showed by a significant drop in cell viability after laser treatment, when the film loaded with 5-ALA was used compared to free 5-ALA demonstrating the peculiarity of the prepared film for future application in PDT.

The graph shows a considerable increase in cytotoxicity of the samples containing CS films with added 5-ALA.

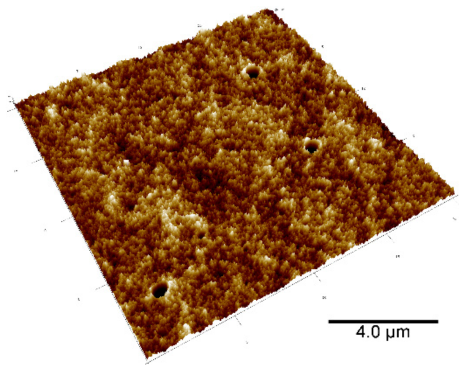

Fig. 1. *Surface morphology of chitosan crosslinked tannic acid film*

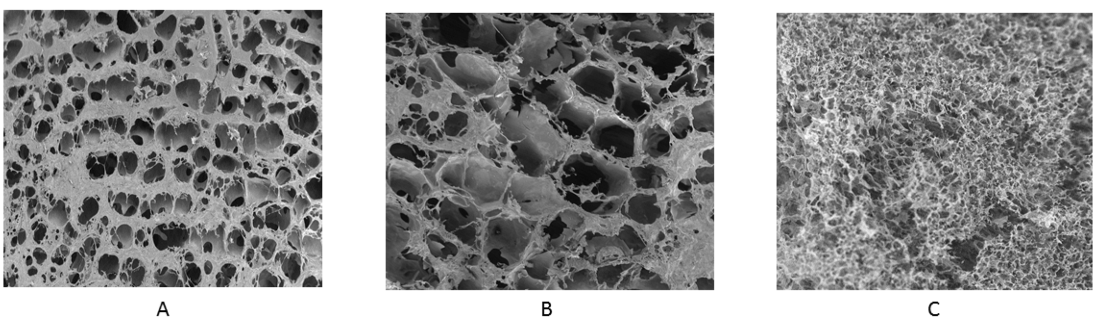

Fig. 2. *Porosity of chitosan crosslinked tannic acid film. Bar scale : A) 10 µm; B) 5 µm and C) 50 µm*