**European Journal of Research Development and Sustainability (EJRDS)**
Available Online at: https://www.scholarzest.com
Vol. 3 No. 11, November 2022
ISSN: 2660-5570

# NANOPOROUS LAYERED MATERIALS BASED ON BIO-COMPATIBLE POLYMERS

**Kasimov Asroriddin Sadievich**
Head of the General Physics Department of Termiz State University
**Sobirova Gulnoza Olim's daughter**
2nd stage graduate student of Termiz State University

**Article history:**

**Received:** 24th September 2022
**Accepted:** 26th October 2022
**Published:** 30th November 2022

**Abstract:**

Research objects: optical properties of cotton fiber grown in Surkhandarya region.
The purpose of the work: to study thin-fiber cotton cellulose grown in Surkhandarya, to determine its optical properties, to develop ways to eliminate errors and shortcomings, and to give practical recommendations.
Obtained results and their novelty: The development of modern nanotechnologies and nanotechnologies is closely related to the creation of new nanomaterials, in particular, nanoplastics of polymers with unique properties. Nanofibers are obtained by the method of electrospinning from solutions and mixtures of polymers under the influence of high direct voltage, which makes the "jet-nanofiber" transformation similar to dry spinning from anode.
Practical significance: The application of the scientific proposals and practical recommendations developed as a result of the research in the study of the optical properties of cotton fiber...
Field of application: Cotton is widely used in industrial scientific centers

**Keywords:** Nanotechnology, nanotechnology, nano fibers, chitosan, fibroin, non-woven laminates

The characteristics of nano fibers and non-woven materials based on them largely depend on the choice of polymer and electrospinning conditions. In this regard, obtaining nanofilaments of biocompatible polymers, for example, chitosan, fibrion, acrylonitrile copolymer, cellulose and its derivatives, etc., is of great interest. Chitosan and fibrion nanofilaments are characterized by clear bioactivity, which is most clearly manifested on the surface of non-woven materials. Therefore, it is desirable to obtain non-woven layered materials, the surface layer of which consists of biactive biocompatible polymer nanofilaments. Such layered nanomaterials are certainly widely used in medicine, pharmaceuticals, cosmetology, textiles, ecology and other fields. In this direction, this work is carried out with the help of a specially assembled electrospinning device, which allows to create polymer nanofilaments and make them in the form of non-woven layered materials on the screen. Fibroin and chitosan solutions were prepared in formic and acetic acids, respectively, and acrolytrile copolymer was prepared in dimethylformamide. Optimum conditions of electrospinning are selected by changing the distance between the anode and the cathode (3-15 cm) and the concentration of the polymer solutions (3-20%) at a constant voltage of V=15kV.

In the experiments, the nanofiber layer, which served as the basis for the non-woven material, was formed by electrospinning from a biologically compatible acrylonitrile copolymer solution, and the bioactive surface layer was formed from chitosan or fibrion solutions. The resulting laminates are characterized by high mechanical strength and resistance to deformation stress. For example, samples with an average thickness of 50 micrometers fail when stretched by 15-20% and have a Young's modulus of 5-10, maintaining high mechanical flexibility during repeated bending and twisting of materials.

Polarization optical studies of these samples show that the thickness of the material base layer is approximately 30-45 micrometers, and the thickness of the surface layer is in the range of 5-20 micrometers. These materials were found to be nanoporous and the pore size was less than 1 µm. In general, nanofibers of these polymers are characterized by high optical anisotropy.

At the same time, non-woven laminates do not show clear optical anisotropy due to the random arrangement of nanofilaments in the samples. Non-woven laminates are isotropic. The surface activity of non-woven laminates is mainly related to the presence of functionally active elements, that is, amine and carboxyl groups, selected polymers. These groups are characterized by interactions with oppositely charged elements, ions, groups, etc. This feature is clearly manifested when gaseous and liquid phase mixtures pass through layers of non-woven materials, that is, during filtration. Such filtration experiments are carried out in order to clean waste car oil through non-woven layered materials characterized by average pore sizes of 10,100 and 300 nm. The waste machine was found to flow oil through a non-woven layer for 80 minutes and achieve 95% oil removal. These results indicate high surface activity of non-woven layered materials as nanofilters. Interaction of surface active elements of non-woven layer materials with metal ions using electroosmosis method, non-woven layer was used as a nanoporous membrane.

## REFERENCES

1.Polimerlar fizikasi Kosimov A S. Termiz-2022 180bet
2.Бартенев Г.М., Френкель С.Я. Физика полимеров. Л.:Химия, 1990.
3.Цветков В.Н. Жесткоцепные полимерные молекулы. Л.:Наука. 1986.
4. Кленин В.И. Термодинамика систем с гибкоцепными полимерами. Саратов.:СарГУ 1995.
5. Гросберг А.Ю., Хохлов А.Р. Статистическая физика макромолекул. М.: Наука, 1989.

## USED INTERNET SITES

1. http:// www.samdu.uz;
2. http:// www.library.ziyonet.uz;
3. http:// www.elibrary.ru;
4. http:// www.sciencedirect.com;
5. http:// www.stat.uz (Statistik ma'lumotlar portali);