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Obtaining of Carbon Fibers by Utilization of Coal Tar and Bitumen

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Bitumen and coal tar are an attractive raw material for obtaining of ultrathin carbon fiber due to its low cost stemming from its availability as a residue of coking of coal and petroleum processes.

Electrospinning is a universal method of receiving continuous fibers with a diameter from nanometers to micrometers from solutions or melts of polymers. Ultrathin fibers found the application in many areas. The polymers can be chemically modified by various additives. Now researches in the field of receiving fibers develop mainly in the direction of receiving the modified and structured fibers, synthesis of new polymers for receiving fibers. For producing of carbon fibers as initial components: phenolic resin, lignin, coal tar and oil pitches can be used. At present, up to 98 % of all carbon fibers are made of poly(acrylonitrile) precursor fibers.

Experiments on producing of ultrathin fibers were carried out on traditional installation of electrospinning. For producing of composite fibers blend of PAN-polymer solution and coal tar or bitumen were used. Different ratios of polymer to bitumen (or coal tar) were investigate. Extraction of the organic part of petroleum bituminous rocks was carried out using an extraction method. In this work the bitumen of the "Munailymolla" deposit was used. The mix of bitumen (coal tar)/polymer placed in a syringe on which metal needle gave a negative charge, and on a substrate, respectively, the positive. Tension given by means of a source of constant tension. Tension made – 9 – 11 kV. Distance between electrodes is 15 cm. The consumption of polymer solution made 60 μl/s, answering to the optimum speed of an exit of solution at which all output solution is extended in fibers. Electrospun-fibers were carbonized in argon atmosphere at high temperature.

Carbon fibers are used in medicine, optics, electronics, for the manufacture of composites and as filter materials. Also, carbon nanofibers have potential for use in various new applications such as electrodes, catalyst supports, etc., due to their large surface area and relatively high electrical conductivity.

Biography:

Smagulova Gaukhar has completed her PhD in the topic of "Nanotechnology and Nanomaterials", researcher of the laboratory "Synthesis of carbon nanomaterials in flame" RSE "Institute of Combustion Problems", Lecturer of the Faculty of Chemistry and Chemical Technology of al-Farabi Kazakh National University (Republic of Kazakhstan, Almaty). Smagulova G.T. is author of 2 patents, 80 publications in the rating journals of the Republic of Kazakhstan and foreign countries. She passed scientific internships in the USA (University Texas at Dallas, Richardson) and Japan (Waseda University, Tokyo) and won in battle of start-up projects SPRING'17 Almaty Tech Garden with the project "Electro-conductive textiles based on glass cloth with coating of carbon nanotubes". Scientific interests are in synthesis of carbon nanomaterials and their application.