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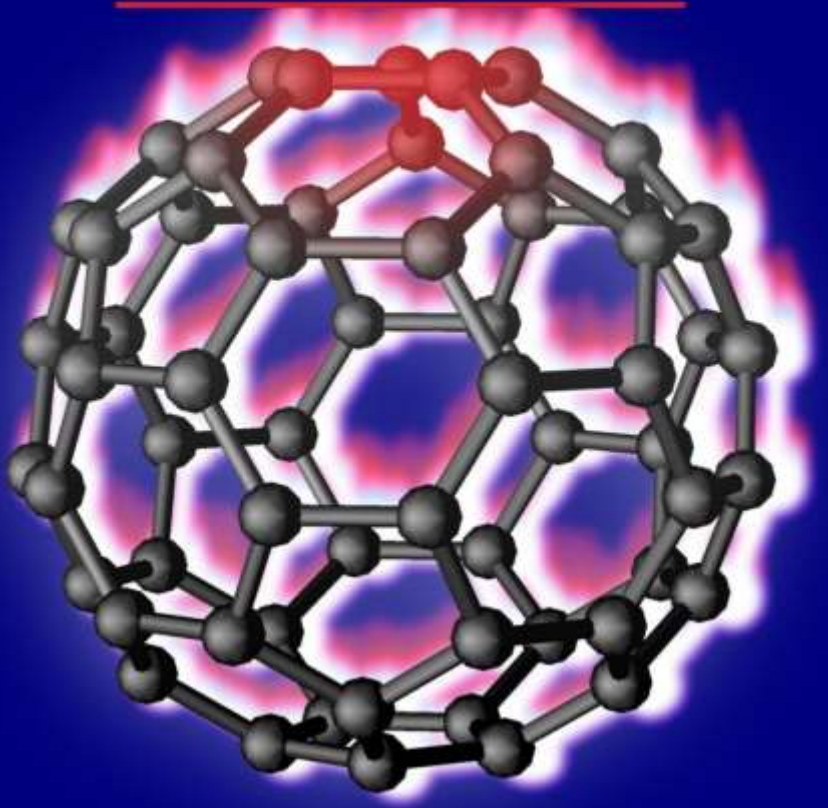
Al-Farabi Kazakh National University
International Science and Technology Center
The Institute of Combustion Problems
National Nanotechnology Laboratory of Open Type

X International Symposium

The Physics and Chemistry of Carbon and Nanoenergetic Materials



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Chapter 7

POSTER PRESENTATIONS

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COAL TAR PROCESSING INTO NANOMATERIALS

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Abstract. Experiments on the extraction of technogenic nanofibers from coal carbonization products, namely, coal tar are under development. In particular, the technology for producing nanofibers from coal tar using electrospinning method under research.

In 2017, according to the BP Statistical Review of World Energy, the coal production in Kazakhstan was 47,9 million tonnes of oil equivalent whereas coal consumption was only 36,2 million tonnes of oil equivalent. Theoretically remained 11,7 million tonnes of oil equivalent may be processed into nanomaterials [1].

The main importer of Kazakh coal remains Russia, but the development of the energy sector of the Russian Federation assumes a gradual transfer of consumption by the Ural power plants from Ekibastuz coal to Kuznetsk coal. The increase in export volumes of Ekibastuz coals in the Russian direction is not forecasted, due to the adoption of a program for the development of the Russian coal industry for the period up to 2030, by order of the Russian government. According to this program, it is planned to replace the consumption of Kazakh (Ekibastuz) coals by Russian power stations with Kuznetsk coal and the transition of individual Russian power plants to gas [2].

At a joint seminar of the Institute of Combustion Problems and the Kazakhstan Highway Research Institute, Professor Mansurov Z.A. and Teltayev B.B. proposed the idea of processing local coals into the products with high added value, such as nanofibers, which are widely used in medicine, biotechnology, power engineering, filtration systems, composite materials, etc.

The interest in nanofibers production caused by the fact that the mechanical properties of these materials, such as tensile strength, bending and compression, the elastic moduli increase with decreasing fiber diameter and accomplish a theoretical limit when reaching the nanoscale level.

Coal tar pitch is a solid product of coal tar processing with the yield of 50-60 wt%. Pitch is a homogeneous and thermoplastic substance of black color with a brilliant wrinkled fracture [3].

The advantages of the electrospinning method is that, unlike normal, mechanical extrusion of fibers from a solution, it does not show high requirements for the chemistry of the process, does not require high temperatures for fiber solidification, and therefore, allows the creation of fibers from long and complex molecules. Electrospinning is a complex, profitable and simple method for manufacturing nanofibers.

Currently, at Institute of Combustion Problems, a new technology for producing nanofibers from coal tar using electrospinning method under development. In connection with the release of a huge amount of non-sold coals, it opens the possibility of developing new deep processing of local coal technologies in Kazakhstan and construction of new enterprises near the coalfields, which in

turn will smooth out export restrictions, reduce social tension, and bring new branch of nanotechnology to our country.

References:

[1] The BP Statistical Review of World Energy, June 2018, P. 38-39

[2] «Samruk-Energo» JSC, https://www.samruk-energy.kz/ru/

[3] Coal tar // The Big Soviet Encyclopedia (in 30 tons) / Ch. Ed. A. M. Prokhorov. - 3rd Ed. - Moscow: «Soviet Encyclopedia», 1973. – Vol. XI. - P. 258. - 608 p.