The results of calibration of α -, β- and γ-radiation scintillation detectors (ATOMTEX, Republic of Belarus) mounted into boreholes at depths of 0.5 and 1 m, which are destined for soil radon monitoring, are represented. The radon isotopes radiometer based on semiconductor alpha spectrometry (SARAD GmbH, Germany) was used for the calibration aim.

On the whole, time variations of α-particles flux density (FD) at depths of 0.5-1 m badly reflect soil radon dynamics as to diurnal variations and its amplitude. Good synchronism between α-particles FD and radon volumetric activity (VA) time series measured at the same depth was observed only when positive atmosphere temperature and absence of precipitations. It was found a good synchronism in β-particles FD and radon VA changes at depth up to 1 m for daily and synoptic scales. But for certain days a little time shift between β- and radon time series was observed. Maximum in soil radon diurnal variations is usually observed at 16-18 o'clock at 0.5 m depth, and at ~ 24 o'clock at 1 m depth.

Consideration must be given to nonlinear relationship between β-particles FD and radon VA values when determination of calibration coefficients.

In more details questions of the calibration is show in the paper.

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REFERENCES

1. Yakovleva V.S., Parovik R.I. Solution of diffusion-advection equation of radon transport in many-layered geological media // Nukleonika. – 2010. – Vol. 55 (4). – p. 601-606.
2. Yakovleva V.S. Dynamics of radon and its decay products inside an accumulative chamber // Nukleonika. – 2010. – Vol. 55 (4). – p. 595-600.

A VACUUM ARC CATHODE MAGNETIC FIELD AND A SUBSTRATE BIAS INFLUENCE ON A MACROPARTICLE CONTENT DECREASING

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The results of an experimental study of the influence of normal and tangential to the cathode surface magnetic field and short-pulsed high-frequency negative bias applied to substrate immersed in a DC copper vacuum arc plasma are presented. It was found that the macroparticle (MP) surface density depends on the magnetic field, the bias parameters and the processing time.

The experimental data of the MP amount on the steel sample after cooper plasma deposition using normal to the cathode surface magnetic field are presented in Fig.1. Without negative bias total number of MPs on substrate surface increases gradually (Fig. 1, curve 1). Application of short-pulsed high-frequency negative bias significantly affects on MPs surface density and dynamic of their assembling on the substrate during the treatment time (Fig. 2, curve 2). Maximal amount of cooper droplets can be observed after 3 minutes of deposition then MPs surface density starts to decrease. Total reduction of MPs was 3.7 times after 30 second and almost 12 times after 6 minutes of a treatment.

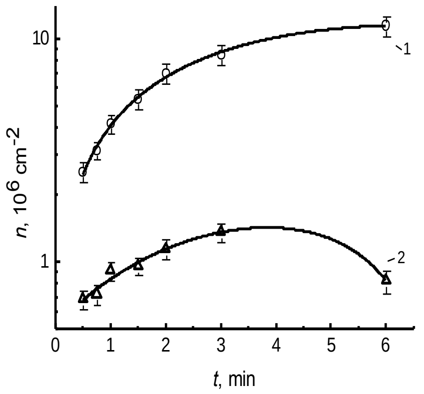

Figure.1. Dependence of MP surface number density on processing time at anode (1) and negative bias (2) potential (7 μs, 10^5 p.p.s, -2 kV)

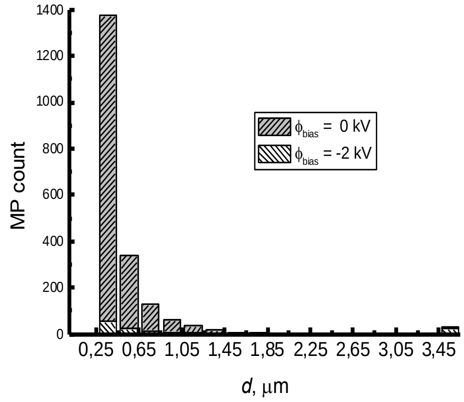

Figure.2. Size distribution histogram for copper MPs on the substrate surface after 6 min of plasma deposition with φ_{sub} = 0 and φ_{sub} = -2 kV

To estimate efficiency of different sizes MPs reduction all samples were scanned with electron microscope and analyzed in details. The size distribution histogram for samples with anode and negative bias after 6 minutes of deposition are presented in fig.2. The experimental data shows that applying of short-pulsed high-frequency negative bias is effective to deleting of MPs with diameter less than 1 μm (up to 25 times after 6 minutes) and very limitedly affects on micron-sized MPs decreasing on a sample surface.

The investigation of a tangential magnetic field influence on MPs surface density decreasing in case of anode and negative repetitively pulsed substrate bias are presented.

АССИМЕТРИЧНЫЕ ТРЕКОВЫЕ МЕМБРАНЫ С КОНТРОЛИРУЕМЫМИ ПАРАМЕТРАМИ

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Фильтрация представляет собой эффективный путь достижения чистоты технологических сред. Среди фильтрующих материалов, используемы в этом процессе, важное место занимают Трековые мембраны (ТМ), изготавливаемые облучением полимерных пленок пуском заряженных частиц и последующим химическим травлением материала области треков этих частиц до получения сквозных пор [1]. Основными отличительными свойствами ТМ являются малая толщина, высокая селективность разделения. Это обуславливает их широкое применение в медицине, электронной промышленности, биотехнологии. Поэтому, создание ассиметричных трековых мембран (АСТМ) с диаметрами пор 0,2 мкм для прецизионной фильтрации растворов солей и биологических жидкостей является актуальностью работы. В работе использованы ТМ, изготовленные из двухосноориентированной полиэтилентерефталатные пленки (ПЭТФ) марки ПЭТ - М. На основе, проведенных исследований созданы образцы химически стойкой ТМ. Структура пористой мембраны формировалась при облучении ПЭТФ пленкой ионами аргона с энергией 41 МэВ с последующей термической предобработкой и