Etching the surface of aluminum foil using high-frequency plasma to produce a nanoporous aluminum oxide membrane

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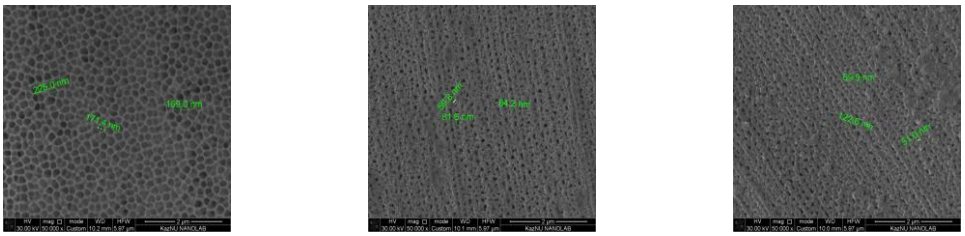
In recent years, the trend of creating and improving sensitive sensors has taken an important place in the field of medicine, environmental monitoring and research of biomolecular interactions. In addition, these nanoporous aluminum oxide films are actively studied in the fields of nanoelectronics, microbiology, and nuclear physics [1].

In this research work, a porous aluminum oxide membrane with pre-treatment of the aluminum coating with plasma was developed for the first time. The process of processing the aluminum film with plasma in a high-frequency discharge, in a vacuum environment, and as a result, the surface oxide layer was destroyed and a surface roughness was formed. During the experiment, a vacuum medium with a Vup-5 device was adopted, a plasma with a pink tinge of 0.6-0.7 Pa was formed between the two electrodes, argon gas was obtained as the main gas, and room temperature was used as the temperature parameter. In order to determine the differences that occur on the surface of the film, the power size was obtained to such a different extent. And the processing time for all films is the same value t=15 minutes. The process of electrochemical anodizing into an aluminum film with this surface treated with plasma was also carried out. As the electrolyte, orthophosphor was obtained, the chemical reaction took place at room temperature 19^0C, voltage U=80 V, t=30 min. The process of electrochemical anodizing was a step-by-step process.



N=20Вт N=50Вт N=70Вт

Fig.1. SEM images of nanoporous aluminum oxide membranes

In the experiment in vacuum environment, in a high-frequency discharge plasma treated surface layer of the aluminum film, based on the electrochemical anodization received nanoporous aluminium oxide. In the course of the study, it was noted that the change in parameters, in particular, differs from the surface roughness due to the different power values of 20 W 50 W and 70 W (Fig. 1).

References

[1] A. Yamaguchi, K. Hotta, and N. Teramae, Anal. Chem., 81: 105 (2009).