ION-PLASMA COATING FORMATION OF PACEMAKER ELECTRODES [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2022.49.1.141

Martynenko Yu.V., Nagel M.Yu., Obrezkov O.I.

National Research Centre “Kurchatov Institute” mifst04nmy@mail.ru

Endocardial pacemaker electrodes implanted in the heart must satisfy stringent requirements, which include biocompatibility, good electrical contact (mainly capacitive) with the heart tissue, strength and corrosion resistance. The coating must have a multilayer structure (see Fig.):

- from below adhesive and protective layers from electrochemical corrosion of the base material of the electrode (0.5-2 microns),

- an intermediate layer with a highly developed structure to increase the contact surface and the capacity of the double electric layer (2-20 microns);

- on top a highly stable electrocontact layer of platinum group metals and their oxides .

The formation of such multi-layer coating is carried out by a complex multi-stage process using a set of equipment installed in one vacuum volume.

 The deposition of the titanium coating is carried out by magnetron sputtering, and the formation of titanium nitride occurs as a result of the co-deposition of reactive nitrogen gas ions [1]. The plasma of reactive nitrogen gas is created by an RF plasma generator [1]. The formation of a highly developed structure of the titanium nitride layer is carried out as a result of accompanying irradiation with Ti ions with energy of up to 30 keV from a pulsed ion source MEVVA [2, 3].

Platinum and iridium coatings are carried out by arc pulse evaporators from targets made of platinum group metals. Reactive gas oxygen provides oxidation during deposition of a layer with a thickness of 0.1 to 5 microns. Oxidation of platinum group metals is necessary to stabilize their properties, since during operation these metals are oxidized as a result of electrochemical reactions.

References

1. Patent of the Russian Federation RU 2503 079 C1
2. Vershok B.A., Martynenko Yu.V., Smirnov V.P., Obrezkov O.I. Method for obtaining nanostructured film coatings, Patent for invention №2371513
3. Nagel M.Yu., Martynenko Yu.V., Nanotechnologies in Russia, 2013, V. 8, № 7–8. P.72-77.
1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLIX/Pt/ru/GZ-Nagel.docx) [↑](#footnote-ref-1)