

VACUUM ELECTRON-ION-PLASMA STAND FOR IN SITU STUDIES OF THE MATERIAL SURFACE USING SYNCHROTRON RADIATION¹

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The report presents a description of a laboratory variant of a vacuum electron-ion-plasma stand (hereinafter VEIPS), designed to study the surface of samples by X-ray phase analysis of coatings obtained by beam-plasma surface engineering methods, in the process of their synthesis in situ mode using synchrotron radiation.

VEIPS can be equipped with gas and metal plasma sources, sources of electron beams and allows you to carry out the formation processes of layers and coatings in a wide range of operating parameters, to diagnose the parameters and composition of the generated plasma, and to monitor the processes of formation of layers on the surface of materials using X-ray diffraction in real time using synchrotron radiation. VEIPS implements the possibilities for determining the dependences between the plasma parameters, the conditions of its effect on the material surface and the properties of the formed surface using the methods of in situ synchrotron studies.

At this stand, it is planned to study the layer formation processes of ceramic single-layer and multilayer structures synthesized by methods of plasma-assisted cathode-arc vapor deposition, magnetron sputtering and by the method of reactive anode evaporation in a low-pressure arc discharge. It is assumed that the main tasks concerning the development and improvement of synchrotron research methods and the determination of the patterns of multilayer coatings phase formation will be carried out at the VEPP-3 synchrotron radiation source located at the Institute of nuclear physics SB RAS.

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