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REFLECTION OF LIGHT IONS FROM LAYERED INHOMOGENEOUS SURFACES CONTAINING, AMONG OTHERS, BORON AND CARBON. THEORY AND EXPERIMENT *)

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The interaction of light ions with energies from hundreds of eV to several keV with solids has a number of features: the development of radiation-stimulated diffusion of the light component of the target; the dominance of the process of atomization of the target by the upward reflected ion flux. Ions reflected from the first wall determine the recycling process in prospective fusion plants. It follows from the above that detailed information on the processes of light ion reflection from stratified surfaces allows us to solve a number of problems related to the first wall.

In this paper, an analytical model of the process of interaction of light ions with layered inhomogeneous surfaces is constructed. A simple quantitative model is presented to describe the spectra of protons reflected from the *k*-th semi-infinite homogeneous material - R_k [1]. To describe the reflection of light ions from a layered inhomogeneous target: a layer of material "1", whose thickness is much less than the transport path length in this material, on a substrate of material "2", the model presented in [2] is used: $R_{12} = R_1 + t_1 \times (R_2\text{-}R_1) \times t_1$. The reflection model for a *k*-layer target is similarly constructed. The developed theory is used to interpret experiments on the reflection of ions from layered inhomogeneous targets performed on a large MEPhI mass monochromator.

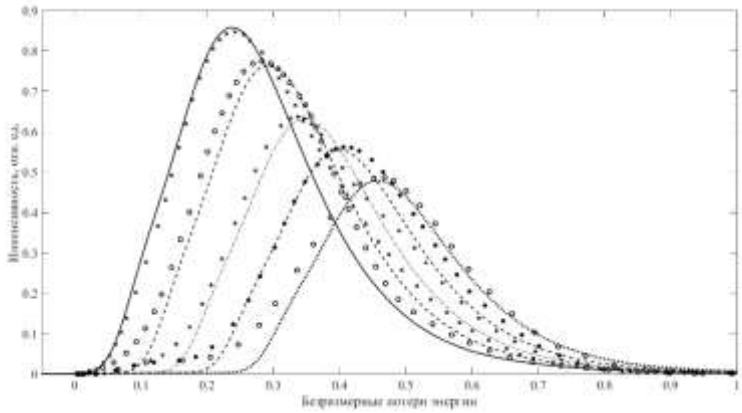

Fig. 1. Energy spectra of protons reflected from a tungsten sample coated with lithium layers of different thicknesses. The angle of incidence is 71°, the angle of reflection is 109°. E_0 = 25 keV. Symbols – experiment [3].

Fig. 1 shows a satisfactory agreement between experimental and calculated results. The lithium layer thicknesses were determined from the stopping power data was taken from NIST. Experimental data of layered inhomogeneous targets with boron and carbon-containing layers are reviewed and interpreted. A critical review of the results of the study is made.

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References

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