MODIFIED SCHEME OF PULSE LASER EVAPORATION

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In number of papers was shown that the pulse laser evaporation technology is promising for the production of the multilayers structures for X-ray radiation range. In particular, the multilayers with the record reflection coefficients at normal incidence at wavelength of 4.47 nm were fabricated by this method [1]. A disadvantage of this method is the presence of ions with energies over 100 eV in a flux of evaporated material. These ions form an intermediate layer reducing the reflection of multilayers. As it is shown in [2], the depth of an intermediate layer was 0.3-0.4 nm at optimum power density of laser radiation on the target.

In the work presented here the modified scheme of the pulse laser evaporation was suggested and the first experimental data obtained with this method for the Ni and C films were given.

The idea of this modification consists in that the laser ablation products reach the second target made of the same material. As a result of the target- flux interaction a secondary flux reaching the substrate is formed. The Lengmuir probe measurements of the ion energy spectrum have shown that the maximum of the energy distribution of Ni ions reduced from 340 eV down to 11 eV. Similar data for the carbon ions are the following: 170 eV in a primary flux and 13 eV in a secondary flux. Measurements of the Ni film reflection characteristics have shown a substantial improvement of the substrate-film boundary sharpness. In addition to the improvement of the boundary sharpness, the weight density of the 4 nm thick Ni films increased from 7.7 g/cm**3for the conventional deposition scheme up to 8.4 g/cm**3 for the improved scheme of deposition. These data evidence that the scheme described enables one to substantially improve the reflection characteristics of multilayers obtained with the pulse laser evaporation method.

1. N.N. Salashchenko, Yu.Ya. Platonov, and S.Yu. Zuev / Nucl.Instr. and Meth. in Phys. Res. A 359 (1995) 114-120.

2. V.A. Chernov, N.I. Chkhalo, M.V. Fedorchenko, E.P. Kruglyakov, S.V. Mytnichenko, and S.G. Nikitenko, Journal of X-Ray Science and Technology N.5, (1995) 65-72.