SOURCE OF POLYENERGETIC ATOMIC FLOWS FOR THIN FILM DEPOSITION.

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The modified powerful source of fast heavy atoms for thin film deposition with a high adhesiveness is submitted in the report.The constuction and main principles of the source of polyenergetic atomic flows are considered. Two space divided flows of atoms with various energies are simultaneously formed in the source: sputtered heavy atoms of energy of 1-100 ev and fast heavy atoms of energy of 1-5 kev. Rate of growth of a film and its properties are regulated both the change of parameters of atomic flows (intensity of flows and energy of atoms) and space position of treated objects. Rate of growth of films can reach 1-2 mkm/h at the area about 1000-10000 sm^2. Deposition of various structure films by many component atomic flows is possible. Results of deposition of thin films by the polyenergetic atomic flows obtained experimentally are resulted.

FAST TITANIUM COATING AT THE GDT FACILITY

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Coating the first wall of fusion devices by titanium, chromium, carbon or beryllium films generally allows to significantly reduce the level of impurities inside the plasma that results in improved plasma containment. Nowadays, several methods for depositing of such films on metallic surfaces are well established. Nevertheless, further development of them as well as studies of the film properties under intensive bombardment by plasma particles are still required. The gas-dynamic trap (GDT) is a magnetic mirror device operated with a hydrogen plasma. A pulsed neutral beam injection serves to heat the plasma and to provide energetic ions. The studies of behavior of these energetic ions is one of the main objectives of the GDT experimental program. In order to decrease the charge-exchange losses of the ions one has to reduce the recycling of neutrals at the first wall. For that purpose an array of Ti-evaporators of the electric-arc type has been installed inside the central cell of the device. This enables us to cover the 15m^2 internal surface within 250ms by a quite homogeneous 6A thick Ti-film. The neutral particle balance in the presence of neutral beam heating has been studied. With the fresh Ti-coated first wall, it was found that the wall recycling coefficient for the neutrals with mean energy of $\approx$5keV is close to unity. The experimentally measured density of neutrals near the wall was compared with the results of Monte-Carlo simulations. The comparison shows that the simulation results agree with the experimental data within the measurement accuracy. Therefore, the conclusion may be drawn that the characteristics of the evaporated film are essentially identical to that of pure metallic titanium.