*34th EPS Conference on Plasma Phys. Warsaw, 2 - 6 July 2007 ECA Vol.**31F**, P-2.070 (2007)*

INFLUENCE OF IONS' BOMBARDMENT ON THE BERYLLIUM FILM FORMATION BY THERMIONIC VACUUM ARC METHOD

C. P. Lungu[1], I. Mustata[1], A. Anghel[1], C. C. Surdu-Bob[1], P. Chiru[1], A. M. Lungu[1], V. Zaroschi[1], M. Ganciu[1], A. Surmeian[1], C. Diplasu[1], C. Oproiu[1], R. Minea[1], M. N. Nemtanu[1], G. Burcea[2], V. Turcanu[2], O. Dutulescu[2], F. Din[2], I. Vâță[3], E. Ivanov[3], D. Dudu[3], M. Lazarescu[4], C. Logofatu[4], C. Negrila[4], F. Miculescu[5], M. Miculescu[5], V. Midoni[6]

[1]*National Institute for Lasers, Plasma and Radiation Physics, Bucharest, Romania*
[2]*Nuclear Fuel Plant, Pitesti, Romania*
[3]*"Horia Hulubei" National Institute of Physics and Nuclear Engineering, Bucharest, Romania*
[4]*National Institute of Material Physics, Bucharest, Romania*
[5]*Politehnica University, Bucharest, Romania*
[6]*SC MEDAPTEH SRL, Bacau, Romania*

ABSTRACT:

Be films depositions having thickness of 10 - 50 nm onto copper, carbon, tungsten and stainless steel substrates were performed using thermionic vacuum arc (TVA) method [1]. A cathode filament surrounded by a Wehnelt cylinder, heated by an external low voltage-high current defines the TVA gun and the cathode of the arc discharge. Thermo-electrons emitted from the tungsten filament were accelerated towards a beryllium anode rod. High evaporation rate of the anode material leads to high vapor density in front of it. The space density of these particles was high enough to lower the ionization mean free path making it smaller than the cathode - anode distance. As a result, plasma was ignited in that region while the surrounding space was evacuated below 10^{-3}Pa. Under these conditions high purity films of the anode material were deposited onto substrates. Energetic (200-500 eV) Be ion bombardment of the growing layer leaded to the formation of pure, compact and adherent Be layers.

The prepared films were irradiated with electrons and neutrons (mean energies of 0.01- 7 MeV) and were analyzed before and after irradiation by glow discharge optical emission spectroscopy (GDOES), Rutherford backscattering spectroscopy (RBS), X-ray photoelectron spectroscopy (XPS) and scanning electron microscopy (SEM).

Be-metal compounds were identified, and the diffusion beryllium dept profiles were determined.

References

[1] C. P. Lungu, I. Mustata, G. Musa, A. M. Lungu, V. Zaroschi, K. Iwasaki, R. Tanaka, Y. Matsumura, I. Iwanaga, H. Tanaka, T. Oi, K. Fujita, Surf. and Coat. Techn., **200**, 399 (2005).