The INVESTIGATION OF THE DEGRADATION OF MO MIRRORS OF ITER OPTICAL DIAGNOSTICS IN the case of modelling of WATER leakage TO THE reactor CHAMBER

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Results of the experimental investigation of degradation of ITER optical diagnostics Mo mirrors [1,2] optical quality in the case of accident event with water leaking inside of the reactor chamber are presented. Single cristal, polycrystal Mo mirrors as well as Mo mirrors with a protective coating (Al + SiO2) produced by NPO “Luch” have been used.

Three possible scenarios were taken into account: 1) small leak in the water cooling system near the mirror; 2) steam event with interaction between vapor and mirror material [3]; 3) steam event with interaction between liquid water and mirror material.

In all considered cases the degradation of mirror optical quality has been observed. Dependences of mirror specular reflectance and diffuse scattering from the time mirrors have been exposed in water are shown in figure 1 for two wavelengths: 450 nm (lower border of the H-alpha diagnostic) and 656 nm (Hα line). As it was shown by scanning electron microscopy the formation of dielectric layer (molybdenum hydroxide) takes place during interaction between Mo and water.

Mirrors with pollution obtained with this technique will be used for testing of the mirror cleaning system based on the direct current/pulsed direct current discharge.



**Figure 1.** Evolution of the specular reflectance and diffuse scattering of the Mo mirror during its exposition in water (*T* ≈ 100°С).

References

1. I. Orlovskiya, A. Alekseev, E. Andreenko, K. Vukolov, V. Denisov, A. Klyatskin, A. Lukin, A. Melnikov, E. Muslimov. Fusion Engineering and Design. 2015. V. 96–97. P. 899-902.
2. A. Litnovsky, V.S. Voitsenya, A. Costley, A.J.H. Donne. Nuclear Fusion. 2007. Vol. 47. №8. P. 833-838.
3. L. Topilski. Accident Analysis Report (AAR) Volume II - Reference Event Analysis. 182 p. IDM UID: 2DJFX3.