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DUAL MAGNETRON SPUTTERING WITH HOT TARGETS TO DEPOSITION CR COATINGS ONTO ZR ALLOY*

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Nowadays, a one of crucial problem of nuclear fuel elements is oxidation of fuel cladding under normal operation and accidental conditions. At present, the problems of swelling of fuel elements and its embrittlement can be solved by limiting the period of usage of fuel elements in the core of a nuclear reactor. However, the fast zirconium oxidation in water vapor under accidental conditions, for example in the case of loss of coolant accident (LOCA), can lead to destruction of nuclear fuel cladding. This problem can be solved by increasing the resistance of the surface of zirconium fuel cladding to oxidation. The most promising solution seems to be the protective chromium coating which can increase a coping time for emergency situation.

The several papers showed that chromium coating is able to prevent oxidation of the zirconium cladding at 1200 °C up to 5000 s [1-3]. However, it is necessary to significant increase the deposition rate of Cr coatings taking into account the geometry of the nuclear fuel cladding as well as the high number of zirconium claddings required annually for nuclear power plants.

This paper is devoted to show the possibility to use of dual magnetron sputtering systems with hot target to deposit Cr coatings on Zr alloy. The paper considers the dependences of deposition rate, structural properties of Cr coatings *vs.* target power density of dual magnetron.

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