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ITR/P5-09: Experimental Simulation of Beryllium Armour Damage Under ITER-like Intense Transient Plasma Loads

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Beryllium will be used as a plasma facing material in the next generation of tokamaks such as ITER. During plasma operation in ITER„ the plasma facing materials and components will be suffered by different kinds of loading which may affect their surface or their joint to the heat sink. In addition to quasi-stationary loadings which are caused by the normal cycling operation, the plasma facing components and materials may also be exposed to the intense short transient loads like disruptions, ELMs. All these events may lead to beryllium surface melting, cracking, evaporation and erosion. It is expected that the erosion of beryllium under transient plasma loads such as ELMs and disruptions will mainly determine a lifetime of ITER first wall. To obtain the experimental data for the evaluation of the beryllium armor lifetime and dust production under ITER-relevant transient loads, the advanced plasma gun QSPA-Be facility has been constructed in Bochvar Institute.
This paper presents recent results of the experiments with Russian beryllium of TGP-56FW ITER grade. The mock-ups of a special design armored with two beryllium targets (80 X 80 X 10 mm3) were tested by hydrogen plasma streams (5 cm in diameter) with pulse duration of 0.5 ms and heat load of 0.5 and 1.0 MJ/m2. Experiments were performed at RT temperature. The evolution of surface microstructure and profile, cracks morphology and mass loss/gain under erosion process on the beryllium surface exposed to up to 250 shots will be presented and discussed.

Country or International Organization of Primary Author

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Collaboration (if applicable, e.g., International Tokamak Physics Activities)

ITER Activities

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