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Book of Abstract

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Experiments in the plasma focus «PF-30»-energy absorption and damage evolution on plasma facing

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Plasma Focus is useful in a variety of processes and devices for advanced materials deposition [1], removing [2] and damage studies [3]. The machine may be suitable for fusion first wall studies and its related material researches. The main factors for damage of carbon material, stainless steels under high-energy pulses in DPF devices are heat loads resulting in melting of the irradiated surface layers, erosion of materials (mass loss by evaporation and thinning of samples), formation of different types of surface defects and micro-cracks. The PF-30 facility [4] was used for the testing of materials under incident energies up to 230 J/cm^2.

In the experiments the specimens were exposed to the plasma pulses with perpendicular incidence on the specimen surfaces. Before plasma exposure the weight of the specimens was measured and the profile of the polished surface was recorded with a stylus profilometer to provide a reference for the post experiment profilometry. After the exposure the weight loss was determined and profiles of the ablation craters were measured with a stylus and a laser profilometer. These measurements allowed the direct correlation of local incident energy density and local ablation. Morphological changes were observed by optical and by scanning electron microscopy were shown fig.1.

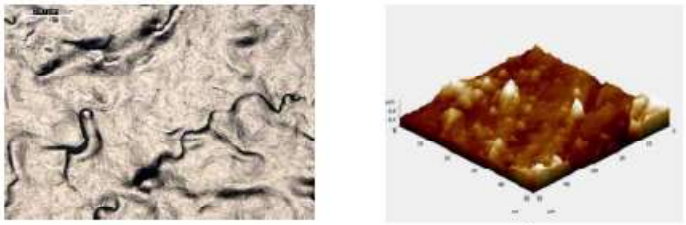

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Fig. 1. SEM image of carbon material, stainless steels target sample 1. Single shot at 12 kV, 0,1 Torr, Ar

In this work carbon material, stainless steels and have been tested. The average weight losses per pulse for specimens exposed to 10 pulses, the energy of plasma's density was 10÷230 J/cm^2. The shape of the ablation craters were determined by 3-d laser profilometery.

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[3] Retsuo Kawakamia, et al., Vacuum 87 (2013) 136-140.
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