Abstract Submitted
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ELM simulation experiments using transient heat and particle load produced by a magnetized coaxial plasma gun K. SHODA, I. SAKUMA, D. IWAMOTO, Y. KIKUCHI, N. FUKUMOTO, M. NAGATA, University of Hyogo — It is considered that thermal transient events such as type I edge-localized modes (ELMs) and disruptions will limit the lifetime of plasma-facing components (PFCs) in ITER. It is predicted that the heat load onto the PFCs during type I ELMs in ITER is 0.2-2MJ/m2 with pulse length of ∼0.1-1ms. We have investigated interaction between transient heat and particle load and the PFCs by using a magnetized coaxial plasma gun (MCPG) at University of Hyogo. In the experiment, a pulsed plasma with duration of ∼0.5ms, incident ion energy of ∼30eV, and surface absorbed energy density of ∼0.3-0.7MJ/m2 was produced by the MCPG. However, no melting occurred on a tungsten surface exposed to a single plasma pulse of ∼0.7MJ/m2, while cracks clearly appeared at the edge part of the W surface. Thus, we have recently started to improve the performance of the MCPG in order to investigate melt layer dynamics of a tungsten surface such as vapor cloud formation. In the modified MCPG, the capacitor bank energy for the plasma discharge is increased from 24.5 kJ to 144 kJ. In the preliminary experiments, the plasmoid with duration of ∼0.6 ms, incident ion energy of ∼ 40 eV, and the surface absorbed energy density of ∼2 MJ/m2 was successfully produced at the gun voltage of 6 kV.

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