Abstract Submitted
for the GEC17 Meeting of
The American Physical Society

Transition in sheath structure near emissive grooved surface in discharge plasma controlled by electron beam.[1] IRINA SCHWEIGERT, George Washington University, Washington, DC, 20052, T. S. BURTON, G. B. THOMPSON, The University of Alabama, Tuscaloosa, AL, 35487, S. LANGENDORF, M. L. R. WALKER, Georgia Institute of Technology, Atlanta, Georgia, 30332, M. KEIDAR, George Washington University, Washington, DC, 20052 — The plasma sheath characteristics, particularly the transition between different types of sheath near the grooved plate made from hBN was studied in the experiment and kinetic simulation. The discharge plasma is sustained by an electron beam from the emissive heated cathode. These beam electrons provide the secondary electrons emission from the grooved plate placed with some distance from the cathode. In the experiment, the critical voltage for 'collapse of sheath' was measured for a planar surface and grooved surfaces for a 1 mm and 5 mm grooved depth. The 2d3V PIC MCC simulations were performed for the experimental conditions. The measured response of sheath structure near the grooved emissive surface on the change of discharge voltage shows an increase the critical voltage with grooved depth. In the 2d3V PIC MCC simulations, the collapse voltage was obtained with an increase of groove depth which is in good agreement with experimental data. It was shown in simulations that the increase of critical voltage for grooved surface is attributed to a variation of the potential distribution near the grooved surface and the redistribution of electron flux from the plasma to the plate.

[1]The authors gratefully acknowledge FA9550-11-1-0160.

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Date submitted: 02 Jun 2017 Electronic form version 1.4