Contribution ID: **3371** Type: **not specified**

P2.4009 Electron Temperature Control in a Double Plasma Device by Selective Charging of Multi Grid Assembly

Tuesday, 9 July 2019 14:00 (2 hours)

See full abstract here:
http://ocs.ciemat.es/EPS2019ABS/pdf/P2.4009.pdf
A double plasma device comprising of two isolated SS304 chambers namely, source and target plasma chambers is used to develop understanding on mechanism involved in realizing a control on electron temperature in the target region. Electron temperature is controlled locally as well as radially by charging a single grid and by charging radially, different regions of a multiple grid assembly. Unmagnetized plasma is produced in the grounded source chamber at a fill Argon pressure of 3 x 10-4 mbar by applying a bias voltage of -70V with respect to a multi filamentary plasma source. The target chamber receives primarily the diffused plasma from the source chamber. The role of floating and biased grids, grid transparency and Debye screening are investigated in the two chambers for the control on plasma parameters. Observations with floating grid demonstrate significant reduction of ~ 50% and 70% in electron temperature and plasma density respectively in the target region. For two different grid bias ranges, plasma cooling and heating is observed in the target region. Plasma cooling is seen for a grid bias between - 25 to 0 V and plasma heating for 0 to +15V for grid(mesh size =0.8mm) without really disturbing the source plasma. More prominent heating is observed for larger mesh sized grids. We have successfully established a correlation between mesh size and control on plasma parameters and have shown that control is more prominent when the ratio of source to target density is maximum. The EEDF analysis depicts suppression and enhancement of energetic electrons for the cooling and heating grid bias domains. We expanded this concept for realizing a radial control of electron temperature by charging differently a cassette of radially separated, isolated concentric multiple grids for the two bias ranges. Using this concept, a radial control on electron temperature with gradient scale length of 10cm is achieved. Detailed results on developed understanding on the
mechanism involved will be presented in the conference. References:
[1] R. J. Taylor, K. R. MacKenzie, and H. Ikezi, Review of Scientific Instruments 43, 1675 (1972); [2] Kohgi Kato, Satoru Iizuka, and Noriyoshi Sato, Applied Physics Letters 65, 816 (1994). [3] K. H. Bai, J. I. Hong, S. J. You, and H. Y. Chang, Phys. Plasmas 8, 4246 (2001).

pppo

Presenter: ALEX, P. (EPS 2019)

Session Classification: Poster P2

Track Classification: BSAP