

Understanding of effect of negative ions on the sheath formation by emissive probe and laser induced fluorescence methods

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To understand the effect of negative ions on the sheath formation, emissive probe (EP) and laser induced fluorescence (LIF) method were used. EP has been used to directly measure the plasma potential profile and the sheath/presheath boundary is identified from the steep slope change of the emission current. LIF determines ion flow velocities and ion temperatures from the broadening of fluorescence lines [1,2]. Basic plasma parameters such as plasma density and electron temperature are also measured by a single electric probe. Negative ion plasma is generated by the discharge of Ar+O₂ gas in a cubical chamber (24 x 24 x 24 cm³) with DC filament source with the following conditions: $n_e \sim 10^8 \text{ cm}^{-3}$, $T_e \sim 2 \text{ eV}$, $T_i \sim 0.1 \text{ eV}$. O₂ gas ratio have been changed 0 ~ 10 % to investigate the effect of negative ion to sheath formation. Change of sheath width, plasma potential, ion velocity due to ratio of negative ion concentration will be presented.

References:

- [1] In. Je. Kang *et al*, JINST. 10 (2015) C12019.
- [2] G. D. Severn *et al*, Phys. Rev. Lett. 90 (2003) 145001-1.