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Sustenance of electronegative plasma column in the presence of electron temperature gradient in linear magnetized plasma device SHANTANU KUMAR KARKARI, MIMANSA SHASTRI, HASMUKH KABARIYA, SANJAY MISHRA, Institute for Plasma Research, Bhat Gandhinagar, Gujarat, India, NISHANT SIRSE, Dublin City University, Ireland — Electronegative plasmas are widely popular in semiconductor processing industries as well as for the production of hydrogen neutral beams for plasma heating in fusion devices. This paper describes about the sustenance of electro-negative oxygen plasma in the presence of electron temperature gradient in magnetized plasma column of the linear plasma device. The electron temperature is self-consistently created in the discharge by the energy filtering of electrons across the magnetic field in conjunction with axial losses of energetic electrons at the grounded end plate. Detail measurements of radial plasma parameters performed using planar Langmuir probe finds substantial decrement in the negative to positive saturation current ratio as observed in the central region of the plasma column, characterized by low electron temperature. The negative ion fraction obtained from these measurements are based on a qualitative model that considers the modified Bohm speed in the presence of negative ions including the attenuation of thermal electron current to the probe due to the presence of external magnetic field.

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