Electro-negative plasmas are widely used in plasma processing, ion source for neutral beam heating in fusion devices, plasma etching and ion Hall thrusters. Presence of negative ions principally modifies the sheath thereby affecting the direct transport of charged particle toward the wall or substrate. In some scenarios they lead to discharge instabilities. They are also responsible for various plasma chemistries. While conventional method of measuring negative ion is based on laser photodetachment in conjunction with Langmuir probe, recently we have demonstrated application of a hairpin probe with laser photodetachment for measuring negative ion density and temperature in an ICP Oxygen discharge. This paper presents the novel technique in which pulsed bias hairpin is used against pulsed laser photodetachment for the measurement of negative ions. The principle remains the same except that a strong transient negative potential of the order of few 100 Volts allows to discriminate electrons and negative ions responding to the probe at distinct time scales. This results in observing peak electron density immediately post stimulation of the applied negative pulse. Some preliminary results are presented in the oxygen ICP discharge and results are compared with those obtained by hairpin probe assisted laser photo-detachment.


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