Abstract Submitted
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Synergistic Behavior of a Dual Tandem Plasma Source[1] LEI LIU, WEIYE ZHU, SHYAM SRIDHAR, VINCENT DONNELLY, DEMETRE ECONOMOU, University of Houston, MICHAEL LOGUE, MARK KUSHNER, University of Michigan — The electron energy distribution function (EEDF) is of paramount importance in plasma processing. To control the EEDF, a dual plasma source was developed, consisting of a lower (main) inductively coupled plasma (ICP), in tandem with an upper ICP. The two sources were separated by a grounded metal grid. A boundary electrode (BE) in the upper source could be DC biased to inject charged species between the two sources, in an effort to control the EEDF of the lower (main) source. A Langmuir probe was employed to measure plasma parameters and the EEDF in Ar plasmas. It was found that, without any bias on the BE, low energy electrons were depleted in the main source when both plasmas were cw powered. The low energy electron population in the main source increased with increasing positive BE bias. The reverse behavior was observed in the upper source. The main source was also power modulated at 10 kHz with 20% duty cycle, while the upper plasma was cw powered. Low (0.2-0.8 eV), almost constant T_e was obtained in the afterglow of the main source, with high plasma density ($\sim 10^{11}$ cm^{-3}) at 10 mTorr. T_e could be controlled by varying the BE bias. Simulations using the Hybrid Plasma Equipment Model agreed with experimental data and provided valuable insights regarding the interaction between the two sources.

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