Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Electron information of single and dual rf driven capacitive discharges at atmospheric pressure SANGHOO PARK, WONHO CHOE, Korea Advanced Institute of Science and Technology, SE YOUN MOON, Chonbuk National University, JIAN JUN SHI, Donghua University — Driving frequency is one of the most important parameters in low temperature plasma operation due to its strong influence on reactivity and applicability of the plasma in processes such as etching or deposition. As is well known, the dual frequency technology was developed to separately control ion energy and flux in low pressure low temperature plasmas, and it has been widely in practice in industry. In comparison to the low pressure plasma, the role of driving frequency, particularly dual frequency, in electron and ion kinetics has not been much addressed in atmospheric pressure plasmas. In this work, the electrical characteristics and electron information of single (13.56 MHz) and dual frequency (4.52 MHz + 13.56 MHz) atmospheric pressure argon capacitive discharges were experimentally studied within the abnormal α-mode regime. The results show that electron density (n_e) linearly increases with input rf power while electron temperature (T_e) is not influenced substantially in the single frequency plasma. In contrast, independent control of n_e and T_e was achieved in the dual frequency plasma. As the low-frequency voltage increases with the constant high-frequency input power, T_e decreases from 2.5 eV to 1.8 eV, whereas n_e increases from 7.7×10^{11} cm^{-3} to 1.4×10^{12} cm^{-3}.

Sanghoo Park
Korea Adv Inst of Sci & Tech

Date submitted: 19 Jun 2015 Electronic form version 1.4