Abstract Submitted
for the GEC19 Meeting of
The American Physical Society

Experimental and numerical investigations on characteristics of electron density in pulsed inductively coupled O_2/Ar plasmas[1] WEI LIU, Xi'an Jiaotong University, XIAO-KUN WANG, Dalian University of Technology, SHA-SHA SONG, Xi'an Jiaotong University, YONG-XIN LIU, FEI GAO, YOU-NIAN WANG, Dalian University of Technology, YONG-TAO ZHAO, Xi'an Jiaotong University — The characteristics of electron density (n_e) in pulsed inductively coupled O_2/Ar plasmas have been investigated by means of a time-resolved hairpin probe and a two-dimensional (2D) hybrid model. A decrease of n_e has been found at the beginning of active-glow in the discharges with high pulse frequencies. By means of the 2D hybird model, the decrease of n_e can be attributed to two reasons: one is the large consumption rate of electrons at the probe position and another one is the axial electron flux toward the coils at the very beginning of active-glow. Besides, the high energy electrons which formed near the coils can hardly arrive at the probe position due to their short electron energy relaxation length (smaller than the reactor length L = 10 cm). Thus the electron generation via ionization processes becomes unimportant at probe position and the increase of n_e after its minimum is dominated by the axial electron flux (toward the substrate). However, the temporal variation of n_e at P2 (close to the coils) has tremendous difference than that at probe position. This is because the ionization processes dominate the electron generation during the active-glow.

[1]This work was supported by the National Natural Science Foundation of China (NSFC) (Grand No. 11805150, 11675039, 11705141, 11775282)

Wei Liu
Xi'an Jiaotong University

Date submitted: 30 May 2019 Electronic form version 1.4