Abstract Submitted
for the GEC17 Meeting of
The American Physical Society

Two-dimensional fluid simulation in a radio frequency capacitively coupled plasma sustained in $SiH_4/N_2/O_2$[1] WENZHU JIA, YUANHONG SONG, YOUNIAN WANG, Dalian University of Technology — In a low pressure radio frequency capacitively coupled plasma sustained in $SiH_4/N_2/O_2$ gas mixture, we investigate how the dielectric layer on the bottom electrode plays it's role on the plasma characteristics by using a two-dimensional fluid model. The simulation results show that the presence of the dielectric layer could effectively suppress the non-uniformity of plasma caused by the edge effect. When the dielectric thickness increases to a certain value, the discharge will be extinguished. In addition, for the possible gas-phase precursors in $SiH_4/N_2/O_2$ gas mixture, nitrogen, silicon, and oxygen-containing species are examined as a function of the pressure and composition ratio of the mixed gas. The results show that SiH_3O, SiH_2O, O, N and NO may be the most important deposition precursors, rather than SiN and HSiNH,etc. Moreover, the large amounts of water are formed by a number of oxygen and hydrogen-containing species presented in this gas mixture. At last, the calculated deposition rate of O, N and Si atoms are also discussed in terms of the gas pressure and composition ratio in order to predict what kind of silicon-based film can be formed.

[1]This work was supported by the National Natural Science Foundation of China (Grant No. 11275038 and 11675036)

wenzhu jia
Dalian University of Technology

Date submitted: 02 Jun 2017 Electronic form version 1.4