

Abstract Submitted
for the APR10 Meeting of
The American Physical Society

The Effect of SF₆ dilution in an Argon plasma SUDIP KOIRALA, Microelectronics-Photonics Graduate Program, MATT GORDON, Mechanical Engineering, University of Arkansas, Fayetteville, AR 72701 — Plasma etching is widely used in semiconductor industries. There have been extensive studies in the dilution of rare gases; however, limited studies are found in the dilution of electronegative gases. In this work, SF₆ content is varied from 5% to 60% in an Ar plasma in a deep reactive ion etching system. A Langmuir probe is used to measure electron temperature (T_e), electron density (n_e), and electron energy distribution function (eedf). T_e decreases monotonically with increasing SF₆ at first, and then increases for SF₆ content greater than 20%. This increase is attributed to the loss of low energy electrons in attachment and high energy electrons in excitation and ionization. As the content of SF₆ is increased above 20%, the dissociation of SF₆ increases and most of the low energy electrons are lost in attachment and hence the average electron temperature increases. n_e decreases by an order of magnitude as the SF₆ dilution is increased from 5% to 60%. eedf shows that the distribution shifts towards high energy with the increase of SF₆ content, which is because of the depletion of low energy electrons.

Sudip Koirala
Microelectronics-Photonics Graduate Program,
University of Arkansas, Fayetteville, AR 72701

Date submitted: 22 Oct 2009

Electronic form version 1.4