

Abstract Submitted
for the GEC16 Meeting of
The American Physical Society

Gas composition influence on ion energy distribution functions in an industrial ICP reactor with biased cathode. DAVID PETERSON, STEVEN SHANNON, North Carolina State Univ, DAVID COUMOU, SCOTT WHITE, MKS Instruments RF Power Division — An industrial ICP reactor consisting of a top planar coil and RF biased lower electrode has been characterized using a hairpin resonator probe and gridded ion energy analyzer to measure electron density in the bulk plasma and ion energy distribution function (IEDF) at the surface of the biased cathode. Argon and oxygen were run at constant total flow with 20mTorr downstream pressure control with varying flow ratios between the two gases ranging from 0% to 100% oxygen content. ICP and bias power were adjusted to maintain constant electron density and sheath bias over this mixing matrix at four different setpoints reflecting high density / high bias, high density / low bias, low density / high bias, and low density / low bias. Although the fundamental parameters governing RF sheath behavior were held constant, several trends in ion energy distribution are observed with respect to gas composition (aside from the obvious influence of ion mass) that show considerable variation in measured IEDF particularly that can be attributed to ion collisions in the sheath as well as gas heating variation due to gas composition.

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Date submitted: 13 Jun 2016

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