

Abstract Submitted  
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**Single and multi-point ion energy distributions in a VHF+RF commercial plasma reactor measured by novel in-wafer ion energy analyzer** BARTON LANE, MERRITT FUNK, LEE CHEN, RADHA SUNDARARAJAN, JIANPING ZHAO, Tokyo Electron America — A novel, all silicon, minimally perturbing, non-contaminating, in-wafer, 2 and 3 layer ion energy analyzer described elsewhere in this conference is used to measure ion energy distributions for a variety of realistic processing conditions in a commercial VHF + 13.56 MHz RF reactor with no modifications to its basic geometry or RF delivery system. Spectra with energies as high 1 keV are measured with resolution on the order of 1%. We show data and discuss the splitting of the high energy peaks due to finite ion sheath crossing time effects and how this splitting scales with frequency, power and pressure. We discuss the origin of the charge exchange peaks. We use the identification of atomic and molecular oxygen ion peaks to estimate the resolution of the diagnostic. The effect of VHF in narrowing ion energy distributions and yielding moderate ion energies will be highlighted. Spectra using a multi-point, 2 layer variant of the ion energy analyzer design were obtained at 4 radial locations for a variety of conditions in argon and oxygen plasmas. These spectra quantify center to edge variations and reveal unique spectral features due to pre-existing modifications to the test reactor's upper counter electrode surface.

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