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Ion Energy Measurements in Continuous Electron Beam-Generated Plasmas<sup>1</sup> SCOTT WALTON, EVGENIYA LOCK<sup>2</sup>, RICHARD FERNSLER, Plasma Physics Division, Naval Research Laboratory, Washington, DC 20375 — The US Naval Research Laboratory has developed a plasma processing system that relies on a magnetically collimated, sheet of multi-kilovolt electrons to ionize the background gas and produce a planar plasma. High-energy electron beams are efficient at producing high-density plasmas (ne > 1010 cm<sup>-3</sup>) with low electron temperatures (Te < 1.0 eV) over the volume of the beam, resulting in large fluxes of low-energy ions (< 5 eV) at surfaces located adjacent to the electron beam. In this work we present plasma diagnostic results using a recently developed, continuous electron beam source. In this work, an energy-resolving mass spectrometer is used to determine the ion energies and fluxes at electrodes located adjacent to the electron beam. These measurements are made as a function electron beam intensity and energy, and electrode bias in argon, nitrogen, and their mixtures at various total pressures. We employ both DC and RF biasing schemes in an effort to provide well-controlled incident ion energies for applications requiring both low and high ion energies. The results of this work are related to bulk plasma properties determined using Langmuir probe diagnostics (See paper by E.H. Lock et al. at this conference).

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