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EED*f* of the DC+RF Hybrid Etcher: Simulation and Measurement LEE CHEN, LIN XU, MERRITT FUNK, Tokyo Electron America — The DC+RF Hybrid is a RF-capacitively coupled plasma etcher with RF applied to the wafer electrode and a high-negative DC voltage on the opposite electrode 3cm away. Secondary electrons from the DC electrode are accelerated by sheath and form ballistic electrons. Gridded energy analyzers are placed behind the RF electrode for EED*f* measurements. Experiment's pressure-range varies from 30mt to 70mt with DC-voltage up to –1kV. EED*f* reveals, (1) Maxwellian bulk, (2) ballistic electrons with energy corresponding to the applied DC-voltage, (3) a continuum from Maxwellian to the ballistic electron peak, (4) middle-energy electrons with distinct energy-peak. Measured EED*f* qualitatively agree with PIC numerical experiments. The energy of the distinct middle-energy peak seems to depend on the sheath thickness and varies from $\sim$ 40eV to 300eV. While ballistic electrons' finite collisions contribute to the continuum, other non-negligible channel such as Landau-damped e^--beam plasma waves, should be considered. The distinct middle-energy peak could be resulted from Landau damping of a strong plasma wave of a specific wave number. The energy range of middle-energy peak is favorable in sustaining ionization, rendering the necessity of heating the Maxwellian bulk for a similar level of ionization.

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