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Diagnostics of ballistic electrons in a DC/RF hybrid capacitively coupled plasma reactor LIN XU, University of Houston, LEE CHEN, Tokyo Electron America, ALOK RANJAN, University of Houston, MERRITT FUNK, RON BRAVENEC, Tokyo Electron America, DEMETRE ECONOMOU, VINCENT DONNELLY, University of Houston, RADHA SUNDARARAJAN, Tokyo Electron America, UNIVERSITY OF HOUSTON TEAM, TOKYO ELECTRON AMERICA TEAM — The DC/RF hybrid is a capacitively coupled plasma etcher with RF voltage on the bottom electrode and negative DC bias on the upper electrode. This configuration can significantly alleviate the electron shading effect and preserve photoresist integrity during plasma etching. It is thought that a group of ballistic electrons is responsible for these results. These high-energy electrons start as secondaries emitted from the negatively-biased DC electrode and accelerate across the DC sheath. They acquire high enough energy in the sheath such that they can cross the bulk plasma without gas-phase collisions. The ballistic electrons either strike the RF electrode or are trapped in the plasma bulk depending on the RF phase. Two gridded energy analyzers mounted on the back of the RF electrode were used to determine the energy distribution of ballistic electrons. The dependence of the ballistic electron energy distribution on DC voltage, pressure and RF power will be presented and compared with simulation results.

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