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Effect of Radio Frequency Bias on the Plasma Density and Electron Heating in Inductive Discharge HYO-CHANG LEE, CHIN-WOOK CHUNG, Department of Electrical Engineering, Hanyang University, Seoul 133-791, Korea — We show experimental observations of the radio frequency (RF) bias effect on the plasma density and electron heating in RF biased inductively coupled plasma (ICP). When the ICP power is relatively small or the discharge is in capacitive mode, the plasma density increases considerably with the bias power, while decrease in the plasma density is observed when the discharge is in inductive mode. The change of the plasma density can be explained by the balance between total power absorption and power dissipation. With small RF bias powers in the ICP, the electron energy distribution (EED) evolves from bi-Maxwellian distribution to Maxwellian distribution by enhanced plasma bulk heating. In the capacitive RF bias dominant regime, however, high energy electrons by the RF bias are heated on the EEDs in the presence of the ICP. The collisionless heating mechanism of the high energy electrons transits from collisionless inductive heating to capacitive coupled collisionless heating by the electron bounce resonance in the RF biased ICP.

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