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Effect of RF Bias on Plasma Parameters and Electron Energy Distribution in RF Biased Inductively Coupled Plasma

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RF biased inductively coupled plasma (ICP) has been widely used in various semiconductor etching processes and laboratory plasma researches. However, almost researches for the RF bias have been focused on the controls of dc self-bias voltages, even though the RF bias can change plasma parameters, such as electron temperature, plasma density, electron energy distribution (EED), and their spatial distributions. In this study, we report on the effect of the RF bias on the plasma parameters and the EEDs with various external parameters, such the RF bias power, the ICP power, the gas pressure, the gas mixture, and the frequency of RF bias. Our study shows the correlation between the RF bias and the plasma parameters and gives a crucial key for the understanding of collisionless electron heating mechanism in the RF biased ICP.

Keywords: RF biased inductively coupled plasma, RF bias, Plasma parameter, Collisionless electron heating