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Temporal Profile of 100-200 kHz Band High-Power Inductively Coupled Impulse Sputtering Glow Plasma

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Plasma source of an inductively coupled impulse sputtering (ICIS) driven by high voltage burst pulse has been developed to generate high density plasma. In this study, the electrical characteristic of the ICIS driven by high voltage burst pulse was obtained using double probe measurements. The experimental apparatus consists of two electrodes immersed in an ICP driven by high voltage burst pulse. The plasma source consists of an inductor consisted of a solenoid coil (42 turn, length 64 mm, 64 μH) wound on the glass tube. A 500 μs wide burst of 157 kHz power supply is employed to generate ICP with repetition rate of 1 Hz. The capacitor (16 nF) is used to consist resonance circuit with the inductor and the power supply. The argon gas is supplied at gas flow rate of 35 sccm into the chamber. The gas pressure is fixed at 15 Pa by a mass flow controller. The coil voltage and current are monitored by a high voltage probe and a current probe. The plasma density and the electron temperature of the produced plasma were evaluated using a double probe measurement. The electric power consumed in the plasma exceeded 7.2 kW. The time-averaged electron temperature was obtained as 6 eV. The maximum plasma density was obtained as 4×10ˆ19 mˆ-3 at 40 mm apart from the coil edge.

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