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Effect of Magnetic Field on High-Voltage Glow Discharge during Plasma Implantation

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Plasma immersion ion implantation (PIII) can be performed using either plasma produced by an internal power source such as RF and ECR or self-igniting high-voltage glow discharge. Sometimes, PIII using these two modes overlay. For instance, glow discharge can occur simultaneously in RF PIII. The self-igniting plasma generation technique has advantages such as lower equipment cost and better control of the interaction between the plasma and sample surface and chamber wall. In our experiments, we discovered that the discharge behavior was influenced significantly by external factors such as pre-existing plasma and magnetic field. In this paper, we report on findings in the effects on the magnetic field on the high-voltage glow discharge process. Different from grid electrons, the magnetic field affects both the delay time (time between the initial on-set of the high-voltage pulse and discharge ignition) and discharge current.

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