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# Two-dimensional fluid simulation of large-area plasma source with parallel resonance antenna

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Inductively coupled plasma source operating at low pressure to improve uniform and high plasma density is widely employed for microelectronic device fabrication. As the size of the inductively coupled source increases, it has the problems related to the electrical characteristic and non-uniformity. To improve the non-uniformity, the roles of the parallel resonance antenna are presented.

The two-dimensional fluid simulation of large-area inductively coupled plasma of argon is utilized to describe the discharge phenomena [1]. A chamber (1020 mm × 830 mm × 437 mm) which consists of 5 quartz tubes for antenna coils is shown in Fig. 1(a). 13.56 MHz, 500 W power is applied to the internal antenna in argon at 10 mTorr. Double-comb antenna optimized to the system is used

The variable capacitors are connected at the side antennas and the center antenna. Fig. 1(b) shows the plasma density profile at $y = 204$ mm. While the peak plasma density is at the center without using capacitors, it is moved to the outer and the coil current uniformity is improved by connecting capacitors at the end of the antenna segments. When the system satisfies LC resonance, the uniformity is improved. In this system, the optimal capacitance is 300 pF.

In conclusion, the current and power absorption at the edge of the chamber can be increased by connecting optimal capacitors at the end of the antenna segments. As a result, the uniform large area inductively coupled plasma source can be obtained.

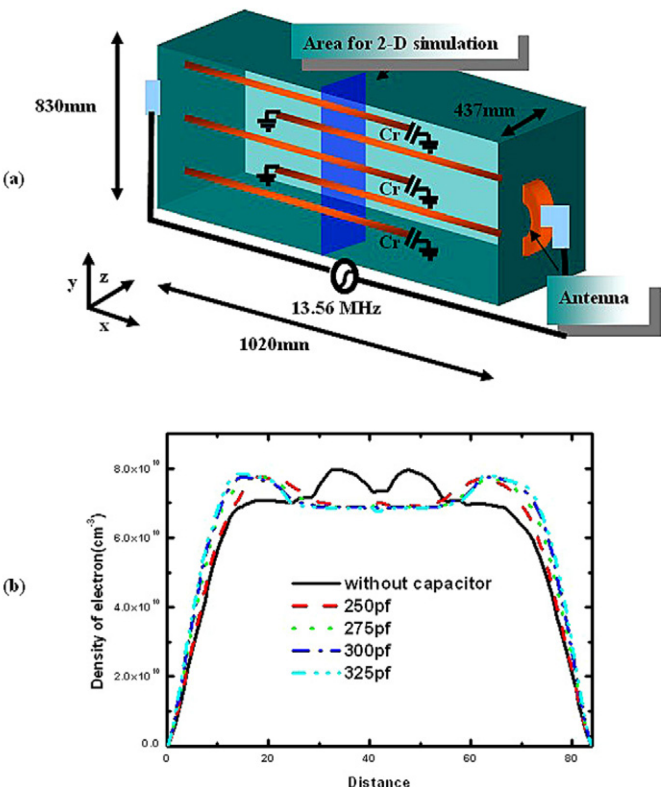


Fig. 1. (a) Geometry of LAPS with variable capacitors, (b) profile of plasma density.

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## References

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