PM-P016

On the Possibility of Multiple ICP and Helicon Plasma for Large-area Processes

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Many studies have been investigated on high density plasma source (Electron Cyclotron Resonance[ECR], Inductively Coupled Plasma[ICP], Helicon plasma) for large area source after It is announced that productivity of plasma process depends on plasma density. Among them, Some researchers have been studied on multiple sources In this study, we attempted to determine the possibility of multiple inductively coupled plasma (ICP), and helicon plasma sources for large-area processes. Experiments were performed with the one and two coils to measure plasma and electrical parameters, and a circuit simulation was performed to measure the current at each coil in the 2-coil experiment. Based on the result, we could determine the possibility of multiple ICP sources due to a direct change of impedance due to current and saturation of impedance due to the skin-depth effect. However, a helicon plasma source is difficult to adapt to the multiple sources due to the consistent change of real impedance due to mode transition and the low uniformity of the B-field confinement. As a result, it is expected that ICP can be adapted to multiple source for large-area processes.

Keywords: multiple sources, ICP, helicon, equal power distribution

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Characterization of Al2O3 Thin Film Encasulation by Plasma Assisted Spatial ALD Process for Organic Light Emitting Diodes

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Organic light emitting diode (OLED) is considered as the next generation flat panel displays due to its advantages of low power consumption, fast response time, broad viewing angle and flexibility. For the flexible application, it is essential to develop thin film encapsulation (TFE) to protect oxidation of organic materials from oxidative species such as oxygen and water vapor [1]. In many TFE research, the inorganic film by atomic layer deposition (ALD) process demonstrated a good barrier property. However, extremely low throughput of ALD process is considered as a major weakness for industrial application. Recently, there has been developed a high throughput ALD, called 'spatial ALD' [2]. In spatial ALD, the precursors and reactant gases are supplied continuously in same chamber, but they are separated physically using a purge gas streams to prevent mixing of the precursors and reactant gases. In this study, the Al_2O_3 thin film was deposited by spatial ALD process. We characterized various process variables in the spatial ALD such as temperature, scanning speed, and chemical compositions. Water vapor transmission rate (WVTR) was determined by calcium resistance test and less than 10^{-3} $g/m^2 \cdot day$ was achieved. The samples were analyzed by x-ray photoelectron spectroscopy (XPS) and field emission scanning electron microscope (FE-SEM).

References

[1] S.H. Jen, B.H. Lee, Steven M. George, Robert S. Mclean, Peter F. Carcia, Appl. Phys. Lett. 96, (2012)
[2] P. Paul, L. Adriaan, R. Fred, S, Karel, D. Maas, V. Ad, Adv. Mater. 2010, 22, 3564-3567

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