

An Experimental Study on Multiple ICP & Helicon Source for Oxidation in Semiconductor Process

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Many studies have been investigated on high density plasma source (Electron Cyclotron Resonance, Inductively Coupled Plasma, Helicon plasma) for large area source after It is announced that productivity of plasma process depends on plasma density.

In this presentation, we will propose the new concept of the multiple source, which consists of a parallel connection of ICP sources and helicon plasma sources. For plasma uniformity, equivalent power (especially, equivalent current in ICP & Helicon) should distribute on each source. We design power feeding line as coaxial transmission line with same length of ground line in each source for equivalent power distribution. And we confirm the equivalent power distribution with simulation and experimental result. Based on basic study, we develop the plasma source for oxidation in semiconductor process. we will discuss the relationship between the processing parameters (With or Without magnet, operating pressure, input power). In ICP, plasma density uniformity is uniform. In ICP with magnet (or Helicon) plasma density is not uniform. As a result, new design (magnet arrangement and gas distributor and etc..) are needed for uniform plasma density in ICP with magnet and Helicon.

Keywords: large-area, ICP, Helicon, parallel connection, equivalent power, coaxial transmission line