

Abstract Submitted
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ICP Source with Immersed Ferromagnetic Inductor VALERY GODYAK, RF Plasma Consulting — Inductively coupled plasma (ICP) sources have found a wide range of applications in various areas of plasma science and technology. Among different ICP topology, ICPs with immersed inductors have benefits (compared to ICPs with helical side or flat top inductors) of better coupling and electromagnetic (EM) field self-screening by the plasma surrounding the inductor. This allows for EM-free outer plasma boundary, thus making an ICP chamber entirely of metal or glass, with no EM radiation outside the plasma. It's been long known that ICP enhanced with ferromagnetic core immersed inductor is applicable in rf light sources and has demonstrated good performance. In this presentation we report a detailed experimental study of the electrical and plasma characteristics of compact ICPs with immersed ferromagnetic inductors in argon and xenon gas. The extremely high plasma transfer efficiency of this plasma source has been demonstrated in a wide range of gas pressure and rf power. A compact plasma cathode built with ICP having an immersed ferromagnetic inductor, and operating at 70-200 W has shown high power transfer efficiency of 97%, and electron emission efficiency of 25 mA/W. These data are superior compared to those demonstrated for other plasma cathodes.

Valery Godyak
RF Plasma Consulting

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