
Absolute electron density measurements for manufacturing-worthy equipment and processes

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Measurement of electron density is intrinsically useful in understanding operational conditions of plasma-based processes. However, measurements in manufacturing equipment is particularly difficult due to aggressive chemistries, poor plasma-grounding, and multiple rf frequencies. Measurements are further complicated in many advanced processes with complex power pulsing schemes resulting in strong temporal changes and substantial negative ion formation during the rf-off periods.

Recently we have developed the Hairpin Microwave-resonance Probe which operates in such demanding environments. The technique yields spatial resolution as small as 1-mm, temporal bandwidth up to 30MHz, for electron density and negative ion measurements.

The results will be presented giving insight into system phenomenology, and is suitable for benchmarking computer simulations.

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