

## Time Resolved Measurements of a Pulsed Plasma with Semion™

### Pulsed Plasmas

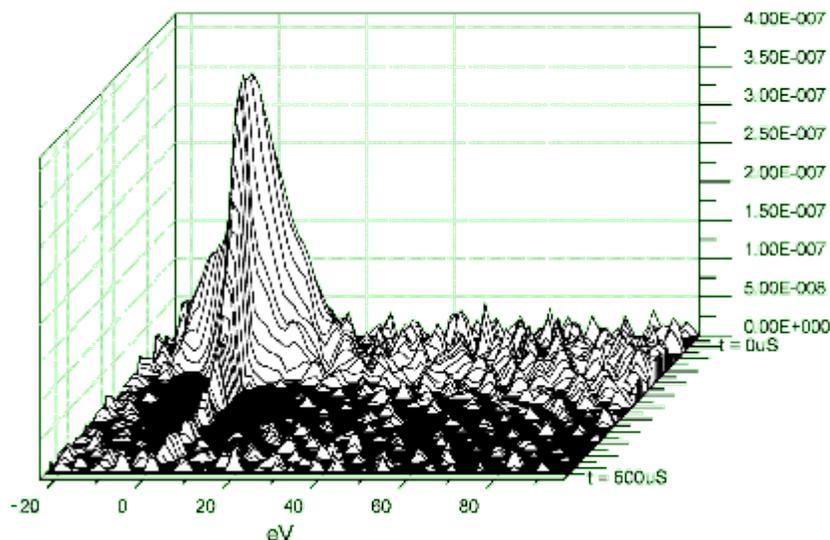
Pulsed RF and DC sources are prevalent in many applications such as surface treatment, deposition of thin films, and ion etching. The Semion™ System is a state of the art Retarding Field Ion Energy and Flux Analyser that operates in a wide range of plasma types and applications. It now features a time-resolved mode which can be used to synchronise the output of a pulsed RF or DC source with the Semion™ Control Unit (SCU). This new feature augments the existing Time-averaged functionality and broadens the analysis capability of the system.

### Time-Resolved Analysis

It is now possible to measure the Ion Energy Distribution Function and Ion Flux of Pulsed Plasma processes at low, medium and high powers at various stages along a pulse period with a resolution of up to 44ns!

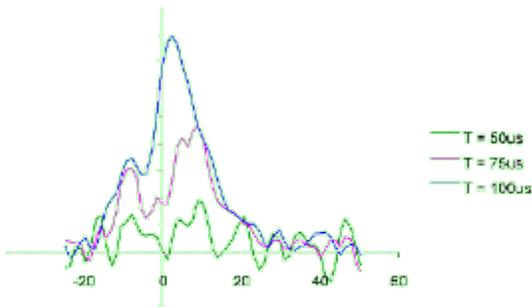
This powerful resolution allows researchers and tool designers to optimise existing process parameters for a wide range of applications.

New processes can be developed with increased efficiency as the effect of each process parameter on the process output can now be measured in greater detail thanks to the high resolution of the Semion™ System .

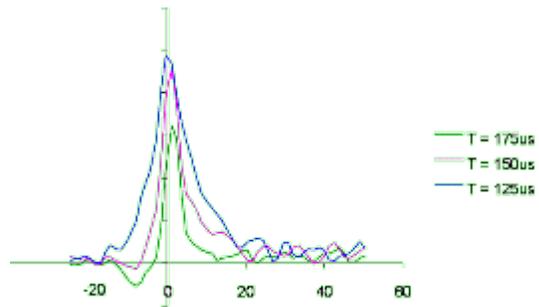


Range of Ion energy distributions between 0µs and 500µs for a Pulse duty cycle 1% at 100Hz on a grounded electrode

Taking examples from the above data, the behaviour of the plasma at various stages of the pulse excitation can be evaluated. The plasma growth phase (on time of pulse) and the plasma decay phase (after pulse off) can be clearly seen from the IEDF plots below.

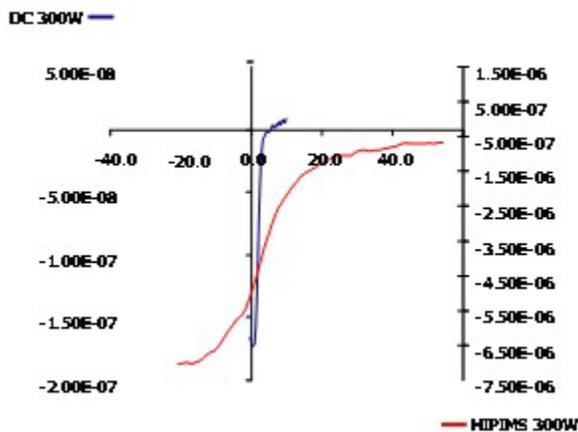


**Growth Phase of Pulsed Plasma**

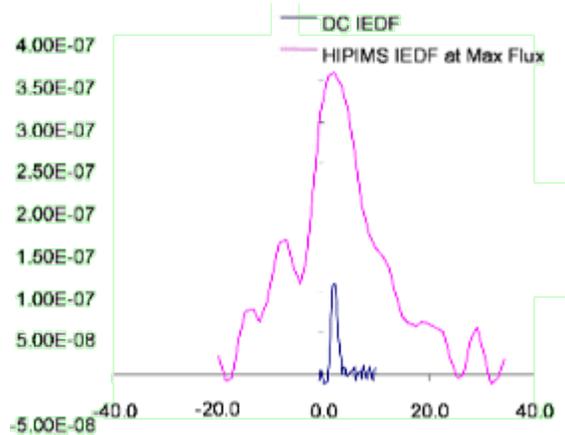


**Decay Phase of Pulsed Plasma**

Analysis of the time-averaged and time-resolved measurements allows different processes to be compared in terms of Ion Flux levels

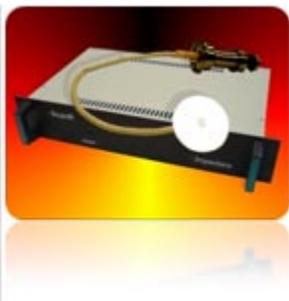


**DC Magnetron & HIPIMS IV Scans**



**Ion Flux Comparison: DC Magnetron & HIPIMS**

**Semion™**



Impedans specialises in the delivery of high performance and high resolution plasma diagnostics solutions to customers in research and industry.

Our products represent the next generation in plasma diagnostics technology, and coupled with our in-depth plasma knowledge and years of experience, our customers can be sure that they can fully characterise, optimise and monitor their plasma process with confidence.