Knowledge based process control in technological high frequency plasmas by Voltage Waveform Tailoring

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As process requirements in plasma technology continue to increase, empirical methods of process development/optimization fail and knowledge-based approaches become essential. Based on a fundamental understanding of the charged particle dynamics in capacitive RF discharges, Voltage Waveform Tailoring (VWT) is introduced as a new method to realize ultimate control of electron and ion energy distribution functions, reactive neutral species generation and uniformity. Selected examples of the underlying fundamental control mechanisms as well as applications will be presented and discussed based on experimental and computational results. Hardware required to upgrade existing plasma tools to VWT will be introduced, e.g. multi-frequency impedance matchings.