Process control in micro atmospheric pressure RF plasma jets

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Non-thermal atmospheric pressure microplasmas have received rapidly growing attention from academic as well as from applied fields. The reactive species in such plasmas are generated at temperatures close to ambient air temperature, and they are of great importance for various applications including plasma medicine, surface etching/treatment etc. The main challenge is to generate and selectively control the application relevant excited species. It is shown that Voltage Waveform Tailoring (VWT), in contrast to classical single frequency discharges, faciliates the wider control of the dynamics of energetic electrons, the electron energy distribution function in distinct spatio-temporal regions of interest. Thus, this allows for enhanced and/or more efficient generation of helium metastables, as well as reactive atomic nitrogen, and oxygen species. We also show that the combination of VWT and structured electrodes makes it possible to greatly influence the electron power absorption dynamics and the generation of excited species inside the trenches.

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