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Particle-in-Cell Simulation for the Control of Electron Energy Probability & Electron temperature of Dielectric Barrier Discharges at Atmospheric Pressure

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Recently, atmospheric pressure plasmas attract lots of interests for the useful applications such as surface modification and bio-medical treatment. In this study, a particle-in-cell Monte Carlo collision (PIC-MCC) simulation was adopted to investigate the discharge characteristics of a planar micro dielectric barrier discharge (DBD) with a driving frequency from 13.56 MHz to 162.72 MHz and with a gap distance of 80 micrometers. The variation of frequency, in the change in the electron energy probability function (EEPF). Through the relation between the ion trajectories and the frequency, results in the change of EEPFs is achievable with the turning point of frequency mode. Therefore, it is possible to categorize the efficient operation range of DBDs for its applications by controlling the interactions between plasmas and neutral gas for the generation of preferable radicals.

Keywords: EEPF, Atmospheric pressure plasmas, Particle in cell, Plasma simulation