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Particle-in-Cell Simulation for the Control of Electron Energy Distribution of Dielectric Barrier Discharges at Atmospheric Pressure[1]
HYO WON BAE, JUNG YEL LEE, HO-JUN LEE, HAE JUNE LEE, Pusan National University — 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 1 MHz to 50 MHz and with a gap distance from 60 to 500 micrometers. The variation of control parameters such as the gap distance, the driving wave form, and the applied voltage results in the change in the electron energy distribution function (EEDF). Through the relation between the ionization mean free path and the gap size, a significant change of EEDFs is achievable with the decrease of gap distance. Therefore, it is possible to categorize the operation range of DBDs for its applications by controlling the interactions between plasmas and neutral gas for the generation of preferable radicals.

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