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Simulation of Chemical Reactions of an Atmospheric Pressure DBD using Graphics Processing Unit PHILIPP MERTMANN, PRIYADARSHINI RAJASEKARAN, NIKITA BIBINOV, PETER AWAKOWICZ, AEPT, THOMAS MUSSENBROCK, MARKUS GEBHARDT, TET, INSTITUTE FOR PLASMA TECHNOLOGY TEAM, INSTITUTE FOR THEORETICAL ELECTRICAL ENGINEERING TEAM — A dielectric barrier discharge in air for biomedical applications is characterized by numerical simulations. Plasma in air produces species like NO or O_3, which are of special interest for medical application due to their potential of reacting on surfaces. Optimisation of plasma conditions to produce required density of these species is simulated using different experimental parameters. Input values for the simulation are obtained by optical emission spectroscopy, current-voltage measurements and micro- photography. Solving diffusion equation considering the gain and loss of particles by plasma-chemical reactions in a transient differential equation can be parallelized very efficiently. The use of a graphics processing unit (GPU, graphics card) for calculations allows for quick solutions of this problem. Performance tests showed that the run-time could be decreased by a factor of about 240, compared to a conventional CPU and thereby from a couple of days to 25 minutes.

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