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Monte Carlo Simulation of the Effect of "Hot" Atoms on Active Species Production in High-Voltage Pulsed Discharges NIKOLAY ALEKSANDROV, Moscow Institute of Physics and Technology, ALEXANDER PONOMAREV, SSC Keldysh Research Center, ANDREY STARIKOVSKIY, Princeton University — Atoms and radicals produced in the discharge plasma possess excessive translational energy (a few electron-volts) that is lost after several elastic collisions with neutral particles. It was shown that, prior to the energy degradation of "hot" particles they can be involved in chemical reactions with high energy threshold. This leads to an additional production of chemically active species. The purpose of this work was to simulate numerically this effect and to calculate the amount of active species produced in discharge plasmas taking into account chemical reactions with "hot" atoms and radicals. The simulation was carried out by a Monte Carlo method allowing competitive consideration of elastic and inelastic collisional processes leading to the translational energy relaxation of particles with excessive initial energy. Using a Monte Carlo technique, energy degradation of "hot" H and O atoms was simulated in CH_4:O_2 and CH_4:air mixtures. It was shown that during the relaxation of H and O translational energy the additional generation of CH_3, OH and H_2 takes place. This affects the total amount and composition of active species produced in high-voltage pulsed discharges.

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