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Calculation of argon-mercury mixture ionization coefficient in low-current glow discharge GENNADY BONDARENKO, Research Institute of Advanced Materials and Technologies of Moscow Institute of Electronics and Mathematics, M.Pionerskaya 12, Moscow, 115054, Russia, MAXIM FISHER, VLADIMIR KRISTYA, Kaluga Branch of Bauman Moscow State Technical University, Bazhenov 2, Kaluga, 248000, Russia — Simulation of electron, ion and metastable motion and interactions in a low-current discharge in argon-mercury mixture used in gas-discharge illuminating lamps is fulfilled. Trajectories of electrons are calculated with the Monte Carlo method, whereas motion of ions and metastables is described on the basis of transport equations. The obtained dependence of the ionization coefficient (IC) on the mercury content in the mixture agrees with experimental data and shows that the IC reaches its maximum under the mercury relative density of the order of 0.001. It is found that the IC increase is mainly a result of Penning ionization of mercury atoms, and contribution of the Penning ionization into the IC increases under lower electric field strength. The discharge ignition voltage as a function of the interelectrode distance is also calculated. It is shown that for discharge in argon results correspond to experimental data and in argon-mercury mixture the ignition voltage has substantially lower value depending on the cathode ion-electron secondary emission rate and the gas temperature.

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