A kinetic model of the ignition of explosive electron emission center ecton\textsuperscript{1,2} on the cathode by the action plasma surface interaction was developed. The model describes the metal microprotrusion (curvature radius 1 micrometer) heating by both plasma metal interaction and joule heating. The model describes the evaporation from the metal surface and correspondent secondary plasma generation. The secondary plasma generation and evolution is described by the kinetic model of 1D3V PIC/DSMC type. The kinetic model takes into account the main types of inelastic and elastic collisions (including the coulomb one) of particles in the plasma as well as evaporation and thermo-field electron emission from the cathode.

In the beginning of calculations the cathode microprotrusion is surrounded by plasma. The plasma parameters are fixed on the boundary placed at the certain distance from the microprotrusion. The applied voltage drop is also fixed on the same boundary. The further evolution of the plasma, current, and cathode temperature is calculated self-consistently taking into account the influence of the plasma generated during the process. Calculations shown, that at the certain condition, in several nanoseconds from process beginning the thermal runaway is developing, and cathode surface temperature reaches the critical temperature. However, this instability is not caused by microprotrusion joule heating, because the total current density is comparatively small ($< 10^8$ A/cm\textsuperscript{2}) at that moment. The most important microprotrusion heating source is the thermal electron flux going from plasma to the surface against the cathode voltage drop. This flux grows with the cathode temperature growing. It leads to the thermal instability and subsequent ignition of the explosive emission center.


---

* Work supported by the Russian Fundamental Research Foundation under Awards 11-02-01428, 11-08-01275