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On the mechanism of the cathode erosion in negative corona discharge ALEXEY PETROV, RAVIL AMIROV, IGOR SAMOYLOV, Joint Institute for High Temperatures RAS, DEPARTMENT 3.3 OF PLASMA TEAM — Negative corona discharge was investigated in atmospheric pressure air and SF_6 in Trichel pulse and glow mode in point-to-plane electrode configuration. As a cathode pointed carbon, copper and aluminum pins with tip size 0.02-1 mm were used. It is found that negative corona causes the erosion of cathode surface in form of nanometer-size craters and fissures. Observed etching may be explained in terms of microexplosive process. This process is initiated by interaction of the cathode surface with the cathode-directed ionization wave. This wave is registered as a Trichel pulse. Local electric field of the head of wave gives rise to the field emission from the cathode surface which initiates microexplosion due to Joule heating. It is assumed that a single Trichel pulse causes the ejection of an erosion fragment from the cathode surface and current on the cathode surface runs through the cross-section of elementary erosion fragment. The value of Trichel pulse action integral which depends on the cathode current density and pulse duration and serves as a criterion of micro-explosion is 10^9 A^2s/cm^4. Hence the conclusion has been made that erosion of the cathode in Trichel pulse mode of negative corona was caused by microexplosive processes. General erosion picture of the cathode surface depends on the discharge dynamics. Correlation between discharge dynamics, erosion picture and Trichel pulse parameters was found.

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