Ionization processes in a transient hollow cathode discharge 100 ns before the electrical breakdown

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Abstract

A Transient Hollow Cathode Discharge (THCD) is a low-pressure high-voltage electric discharge characterized by the presence of an axial aperture in the cathode [1]. The enhanced ionization processes which take place inside the hollow cathode region (HCR) under strongly modified field conditions (third regimen) are essential events which lead to final electrical breakdown. The main effect of the cathode aperture is to modify the geometry of the externally applied field close of the cathode, to create conditions for local ionization in the HCR well before significant ionization builds up in the anode-cathode gap [2]. In previous works [3] it was statistically studied the third and last regime of ionization growth before electrical breakdown, and it was suggested that more than one competing processes take place, both close and inside the HCR, just before breakdown. Statistical analyze of experimental data is presented in order to suggest a temporal sequence of the ionization processes in the third regime of a THCD prior the electrical breakdown