



Charged particle emission from the plasma formed on the surface of ferroelectrics

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We present experimental results of plasma formation on the surface of ferroelectric samples. Different poled and unpoled ferroelectric samples having a disk or tube form and made of $\text{Pb}(\text{Zr},\text{Ti})\text{O}_3$ or BaTiO_3 were tested. Using fast framing photography and different electric probes it was found that the application of a high-voltage driving pulse to the ferroelectric sample causes a fast surface plasma formation. This plasma formation occurs within a few nanoseconds from the start of the driving pulse for all the tested ferroelectric samples and the methods of applying the driving pulse. It was found that reversing the polarization of a ferroelectric does not play a significant role in the process of the plasma formation. Parameters of the plasma and of the neutral flow formed during the plasma formation versus the polarity and the amplitude of the driving pulse are presented. In addition we present experimental results of electron diode operation with an active plasma cathode. We studied the operation of planar and coaxial electron diodes under the application of an accelerating high-voltage pulse ≤ 45 kV with repetition rate ≤ 5 Hz or ≤ 250 kV in a single mode operation. Electron beams with a current density of several hundreds of A/cm² and a time duration of several hundreds of ns were generated. It was shown that the parameters of the electron beam as well as the operation of the electron diode depend strongly on the method of the plasma formation and the time delay between the beginning of the plasma formation and the application of the high-voltage pulse.