

Electron emission from lead–zirconate–titanate ceramics

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(Received 16 August 1996; accepted for publication 1 October 1997)

We report extensive experimental data on electron emission from lead–zirconate–titanate ferroelectric ceramics. A 1–2 MV/m pulse is applied to a gridded ferroelectric cathode and diode currents of up to 120 A/cm² are measured across an *A–K* gap of 5×10^{-2} m, with the anode at 35 kV. Both the current and the anode voltage pulse duration may extend to several microseconds. The measurements extend previously reported data by nearly two orders of magnitude in the diode voltage and by a factor of more than 3 in the diode spacing. Two major regimes of operation were identified. In the first $\sim 1 \mu\text{s}$ the ferroelectric cathode controls the electron flow through the diode. Beyond this time plasma effects dominate the current flow. The results are of importance to the development of novel cathodes for high current electron beam generation. © 1998 American Institute of Physics. [S0021-8979(98)06401-9]