

Theoretical study of a diode with dielectric-gridded cathode

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We investigate the I - V characteristics of a vacuum diode with a gridded cathode. The grid is located on top of a dielectric material that on its back side is covered by a uniform electrode. Ignoring space-charge effects, the current density extracted from the grid is *proportional* to the dielectric coefficient and it is quadratic with the back electrode voltage. Considering only space-charge associated with the back electrode voltage, it is found that the anode current is proportional to the anode voltage. When all space-charge effects are considered, it is shown that the electrostatic energy *coupled* into the diode gap through the grid is responsible to the excess of current beyond the Child-Langmuir limit. © 1998 American Institute of Physics.

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