Influence of alternating low voltage component on field photoemission current forma semiconductor tip

A. Zaporozhchenko[1,2], *stud.*; S.A. Nepijko[2], *Prof.*; G. Schönhense[2], *Prof.*
[1] Sumy State University
[2] Institut für Physik, Johannes Gutenberg Universität Mainz

Field photoemission from semiconductors is of great interest, because in this case the emission current value can be influenced by different factors (light, temperature, etc.). Investigation of the mechanism of influence on field photoemission from semiconductors is an actual problem.

In this work we considered the influence of low alternating voltage of up to 100 V on the field photoemission process from a semiconductor tip under high voltage of 0.7-5.0 kV and photon excitation of 1.3 eV energy. Considered cathodes were made of high-resistivity silicon with p-type conductivity. The measurements were done in the frequency range 20 Hz to 10 MHz in vacuum of 10^{-9}mbar. It was found that at application of low alternating voltage the emission current obtains an addition. The size of this addition can be effectively influenced by varying of the frequency of the low-voltage component.

Besides that, the influence of light, temperature and condition of the emitter surface on the emission process was investigated. Light illumination and heating of the emitter lead to generation of a larger number of free charge carriers (electrons) in semiconductor and change of field emission current, which can be either positive or negative. Due to the influence of the alternating voltage component, the field emission current can increase by 50%.The experimental results are in good qualitative agreement with the known theoretical models [1].

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1. L.M. Baskin, O.I. Lvov, G.N. Fursey, *phys. status solidi (b)* **47**, 49 (1971).