ADVANCED ANALYSIS OF COPPER NANO-TIPS AS COLD FIELD EMISSION ELECTRON SOURCES

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Field electron emission measurements were performed on high purity copper emitters, with apex radii in the nanometer and micrometer ranges, produced by an electrochemical etching technique with phosphoric acid (H3PO4) solution. The measurements were carried out in a high vacuum in rande of 10^{-5} mbar. The current-voltage characteristics (I-V) have been studied and analyzed using Murphy–Good (MG) method type plots. A Scanning electron microscope - Energy- dispersive X-ray spectroscopy (SEM- EDS) were utilized to visualize the emitter's surface and for Study the purity of samples. Furthermore, the spatial distribution of electron emission and the current stability were recorded and used to analyze the electron emission behavior from the tips' surface. Electron mapping indicated a consistent component distribution throughout the copper tips. The results showed an emission current with a bright and additionally stable spatial distribution that started at low voltage.
Keywords: Field electron emission, Current-voltage characteristics, Copper tips, High vacuum.

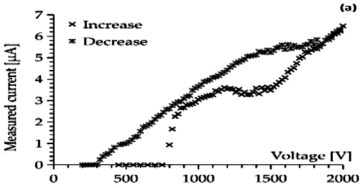

Figure 1: Shows the current-voltage characteristics of copper emitter Cu1.

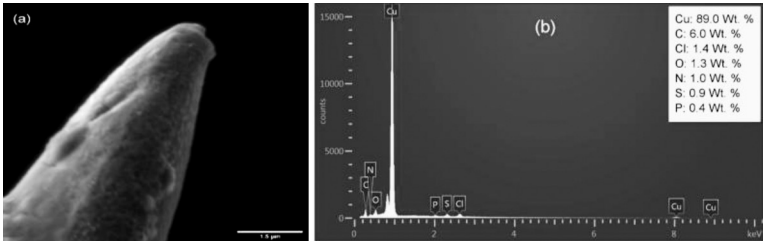

Figure 2: Scanning electron micrograph of a copper field emission apex as shown in (a), and its related EDS results as presented in (b).

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