In-situ characterization of the field emission from individual field emitters through integration of neural network.

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Arbeitsinhalt

Compared to thermal electron sources, electron sources based on **field emitters** do not require high temperatures. In addition, low voltages are required to induce an electron current due to the production of microstructures, for example made of silicon, and a corresponding arrangement of the extraction electrode. However, monitoring this system and the factors influencing various parameters on the overall process present a challenge. A local resolution of the field emission for a large number of emitters is therefore of great importance. This provides information about the performance of the respective field emitters and contributes to a better understanding and characterization of the array, as well as potential optimization.

One of the ways to display and analyze the behavior of the individual tips in an array depending on the parameter settings with as little effort as possible is to use a commercial **CMOS sensor**. The IMPT is researching a **glass-silicon emitter chip** for use in **miniaturized pump technology**. The field emitters are produced by profiling with a dicing machine. As part of this work, the CMOS solution is to be used for the glass-silicon emitter chip. In addition, **a neural network** is to be developed in order to develop correlations between adjustable current, voltage, temperature and the field emitters. Ideally, it will be possible to characterize the current of the individual emitters and make a statement about the service life and wear of the tips as a function of the parameters mentioned.

Art der Arbeit

Master Thesis

Voraussetzungen

- Independent, structured, goal-orientated work
- Interest in microsystems technology, practical work and AI

Starttermin

Immediately

06.09.2024

Arbeitsgebiet: Quantentechnology, Embedded Systems

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