

Electron transparency of graphene and application in field-emission source

Wei Lei, Xiaobing Zhang

¹School of Electronic Science and Technology, Southeast University, P. R. China

Email: lw@seu.edu.cn

ABSTRACT

In a field-emission electron source, a strong electric field has to be applied in front of the emitter. Consequently, many electrons emitted from the source are collected by the gate electrode. It is necessary to develop a triode structure with high transparency ratio for the field-emission source.

Graphene is an atomically-thin layer that consists of carbon atoms sp^2 -bonded into a honeycomb lattice. Recently, the electron transparency of graphene has attracted attention due to its myriad application possibilities^[1,2]. The electron transparency ratio of graphene is depended on the properties of graphene, and the kinetic energy of incoming electrons^[3,4]. In this work, the electron transmission performance of graphene is analysed using scattering model. With this analysis, the variations of electron transparency ratio of graphene with different kinetic energy of incoming electrons, the thickness of graphene, and defects density in graphene are investigated. Moreover, some experiments are designed to verify the theoretical analysis. The potential application of graphene as a transparent electrode in the field-emission source is also discussed.

References

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