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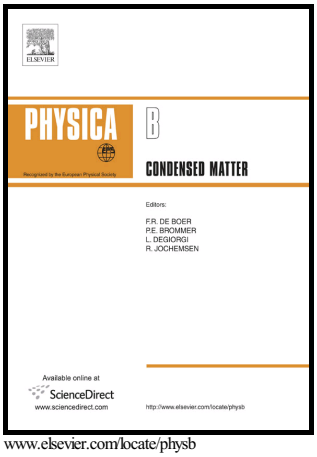


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# Sensitivity of graphene flakes and nanorings to impurities

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**Absract.** In this paper, we consider the influence of impurity on the graphene flakes and nanorings conductance. Based on the jumping Hamiltonian for graphene electrons with its direct diagonalization, we obtain the density of states. Further, the tunneling current is calculated for the following contacts: graphene flake-metal, graphene flake-quantum dots, graphene nanoring-quantum dots. We analyze the effect of the flake dimensions and the positions of the adsorbed molecule of impurity on the characteristic properties of the tunneling current.

**Keywords**: graphene flakes; nanoring; tunneling current



## 1. Introduction

Graphene is a two-dimensional layer of three-dimensional graphite. It is a promising material for the creation of new electronic devices. Most attractive characteristics of the graphene are high crystallinity, ballistic electron transfer (without electron scattering and energy losses) at the sub-micron level and the behavior of charge carriers as massless Dirac fermions. The existence of a ballistic regime is based on the high degree of graphene orderliness and on the fact that electrons in graphene have a high Fermi velocity (about one percent of the light velocity). Therefore, electrons can go a long way before collision. This way is often larger than a size of graphene sample. This fact ensures electron transport through the sample without losses. Graphene samples used in modern experiments are obtained by micromechanical cleavage from

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