Low Energy Electron Transparency of Graphene and Doped-Graphene via Electron Energy Analyzer

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Abstract

The electron transparency of graphene is investigated both experimentally and computationally. In the experiment, the transmission is measured using Hemispherical Energy Analyzer while the computational analysis is based on a simple quasi one-dimensional scattering mode. We find an excellent agreement between the experiment and the theoretical model. The measurements and calculations demonstrated that graphene is an excellent electron transparent material even at low electron kinetic energies where the transmission exceeds 90% with 12 eV energy. Moreover, curve fitting between the experimental data and the model is used to extract the parameters of the experimental setup and the properties of the materials used on it. The obtained parameters matched very well the known values for graphene and the experimental setup. Besides that, as known, there are some discrepancies about electron transparency of graphene in literature. By, detailed analysis, we showed that these are mainly due to the sensitivity of the transmission on the experimental setup. For example, the spread of kinetic energies of the released electrons from electron gun can considerably change the transmission.