

Abstract Submitted
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Is silicon dioxide essential to make graphene visible? Case studies of graphene-substrate interaction¹ CHIA-HAO CHEN, HUNG WEI SHIU, National Synchrotron Radiation Research Center, LO YUEH LO YUEH, HUNG-YING CHEN, SHANGJR GWO, Department of Physics, National Tsing Hua University — Making exfoliated graphene flakes visible is the key to successfully study the fundamental properties of graphene. Conventionally, this can be achieved by placing the graphene flakes on top of silicon substrate with 300 nm SiO₂, but this silicon dioxide layer may cause substrate charging effect. We therefore started to ask ourselves, is silicon dioxide the only material to make graphene visible? Moreover, a recent study has successfully demonstrated a working GaN LEDs with CVD-synthesized multi-layer graphene as conduction electrodes. However, the energy coupling between graphene and GaN is still unclear. To fully utilize the advantage of graphene as transparent electrode, a further understanding of the electronic structure between graphene and the substrate is an urgent task. To answer those questions, we employed theoretical simulation using a model based on Fresnel's law, to calculate the optical contrast of single-layer graphene on various substrate structures. Based on the results, we grew those particular substrates to test the graphene visibility. The graphene flakes and thickness were verified by optical microscope and micro-Raman spectroscopy. The graphene-substrate interactions were then studied by scanning photoelectron microscopy.

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