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Investigation on Tip Enhanced Raman Spectra of Graphene

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Abstract: Tip-enhanced Raman scattering (TERS) is a promising analytical approach for some two-dimensional materials and offers the possibility to correlate imaging and chemical data. Tip-enhanced Raman spectra of graphene are discussed in some details, including substrate, gap between tip-apex and sample surface as well as Ag-nanowire. The TERS spectra give special emphasis to the possibility of TERS tip to induce a large number of defects only while got the tip attached to sample surface. Then the dependence of the TERS spectra of graphene and gap between the probe tip and sample surface was studied, and distribution features of electromagnetic (EM) field around tip were also simulated by finite-difference time-domain (FDTD). The Raman signal enhancement of graphene was further discussed with respect to experimental data. Furthermore, the Ag-nanowire as a nano-antenna could significantly enhance the weak Raman signal of D-band of monolayer graphene is shown, and the TERS spectra of graphene with regard to different regions of Ag-nanowires (endpoints, body) were obtained toward investigating into the distribution of electromagnetic field.

Keywords: Tip-enhanced Raman scattering (TERS), Graphene, Ag-nanowire, Finite-difference time-domain (FDTD)

1. Introduction

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