Optical Characterization of Single Layer and Few Layer Graphene

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Graphene, a single layer of carbon atoms packed tightly into a honeycomb lattice, has been attracting wide attention due to its unique electrical, optical and mechanical characteristics. In order to fully understand this system and put in practical use remarkable effects that are manifested within, detailed characterization of its optical and electrical parameters is required. Here, we report on optical characterization of single layer and few layer graphene via infrared spectroscopy and spectroscopic ellipsometry. Micromechanically exfoliated graphene samples are prepared on SiO_2/Si substrate. Samples are then used for the characterization in NIR range by FT IR spectroscopy. Obtained reflectance is used for retrieving complex refraction index and conductivity of the sample in measured range. In the visible and UV range characterization is done by spectroscopic ellipsometry. Results are again used for retrieving complex refraction index and conductivity of the sample. In the measured ranges conductivity saturates to universal optical conductivity due to dominance of its interband component. Obtained results are in agreement with both theoretical and experimental data reported by other groups.

References

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Figures

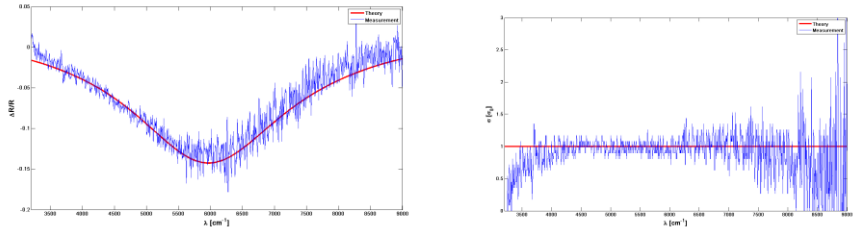

Figure1: NIR measured reflectance and calculated conductivity for single layer graphene sample.

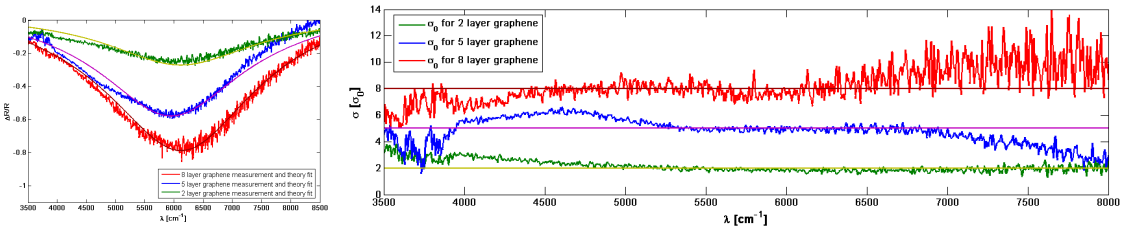

Figure2: NIR measured reflectance and calculated conductivity for different few layer graphene samples.

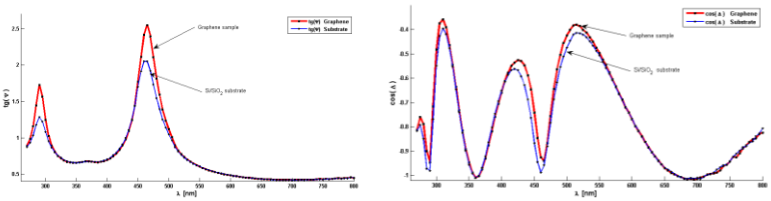

Figure3: Spectroscopic ellipsometry measurements of SLG sample (60º incidence angle).

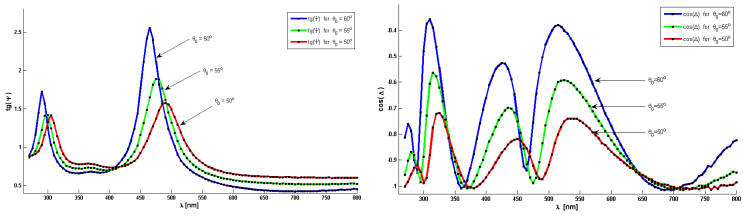

Figure4: Spectroscopic ellipsometry measurements of SLG sample (different incidence angles).

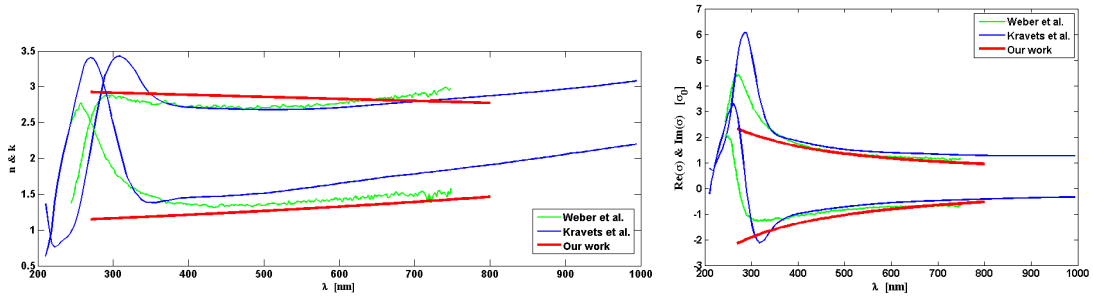

Figure5: Obtained complex refractive index and optical conductivity of SLG sample.