

Preliminary study on the optical properties of single (few) layer graphene/SiO₂ (285nm)/Si in EUV-VUV spectral range

Nadeem Ahmed^{*1,2}

P. Nicolosi^{1,2}, A. E. H. Gaballah^{1,2,3}, K. Jimenez^{1,2,4}, P. Zuppella²

¹ University of Padova, Department of Information Engineering, via Gradenigo 6B, 35131 Padova, Italy.

² CNR-IFN UOS Padova, Via Trasea 7, 35131 Padova, Italy.

³ National Institute for Standards (NIS), Tera St. 12211 Giza, Egypt

⁴ Universidad Autonoma de Santo Domingo, Santo Domingo 10105, Dominican Republic.

Contact@E-mail nadeem7_qau@yahoo.com

Abstract

Graphene is the forerunner of 2D materials. It shows unique performances that are appealing in different technological domains. The unique electrical properties [1, 2], chemical inertness, thermal and chemical stability in harsh environments, mechanical strength and impermeability to ion diffusion promote graphene as very strong candidate for corrosion resistance and protective layer on metals and optical coatings [3,4]. In order to evaluate the real use of such a material, it is important to know the optical response on the selected spectral regions. To our knowledge, the optical properties of graphene have been already studied in the infrared (IR), visible (VIS) and ultraviolet (UV) [5, 6], but no systematic analysis have been performed at the extreme ultraviolet (EUV) and vacuum ultraviolet (VUV) spectral bands. Optical properties of graphene at EUV/ VUV spectral range have been studied by investigating the reflectance of single (few) layer graphene/SiO₂/Si and SiO₂/Si sample. We are reporting the effect graphene layer on the reflectivity of SiO₂/Si at EUV/VUV spectral range first time.

References

- [1] K. S. Novoselov, A. K. Geim, S. V. Morozov, D. Jiang, M. I. Katsnelson, I. V. Grigorieva, S. V. Dubonos, and A. A. Firsov, *Nature* 438(7065), 197–200 (2005).
- [2] Y. B. Zhang, Y. W. Tan, H. L. Stormer, and P. Kim, *Nature* 438(7065), 201–204 (2005).
- [3] W.A. de Heer, C. Berger, X. Wu, P.N. First, E.H. Conrad, X. Li, T. Li, M. Sprinkle, J. Hass, M.L. Sadowski, M. Potemski, and G. Martinez, *Solid State Commun.* 143(1–2), 92 (2007).
- [4] S. Shivaraman, M. Chandrashekhara, J. Boeckl, and M. Spencer, *J. Elec. Materi.* 38 (6), 725 (2009).
- [5] A. Gray, M. Balooch, S. Allegret, S. De Gendt, and W.-E. Wang, *J. Appl. Phys.* 104, 053109 (2008).
- [6] W. E. Wang, M. Balooch, C. Claypool, M. Zawaideh, and K. Farnaam, *Solid State Technol.* 52 (6), 18 (2009).

Figures

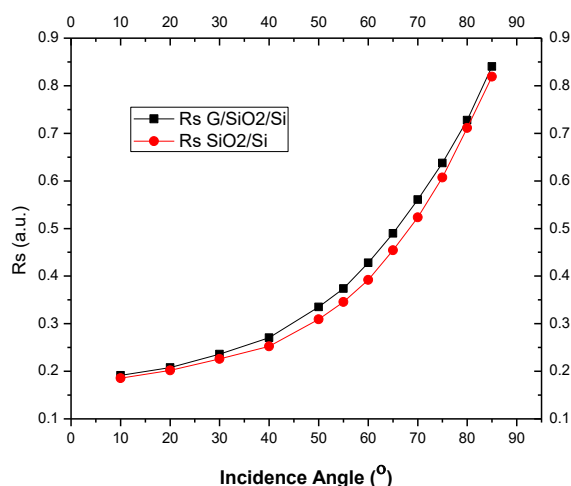


Figure 1: Rs reflectance of SiO₂/Si (red) and graphene/ SiO₂/Si (black) samples. The measurements have been performed at hydrogen Lyman alpha by changing the incidence angle.