GRAPHENE FUNCTIONALIZED BY ULTRA-THIN ANCHOR LAYERS TOWARDS BIOSENSOR APPLICATION

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The functionalization of single layer graphene with specifically binding receptor molecules enables the facile fabrication of biosensors. The linkage between graphene and the receptor can be easily achieved by covalently bound molecules. We present the deposition of ultra-thin layers of such linker molecules on large area CVD-grown graphene by the electrochemical reduction of aryl diazonium salts containing amino, maleimide or thiol groups.[1] The successful deposition of the functional groups and the change of the graphene structure were detected by infrared spectroscopic ellipsometry, Raman backscattering, and electrochemical quartz crystal microbalance measurements. The homogeneity of the about 4.5 nm thin electrochemically prepared functional layer was verified by infrared atomic force microscopy.[2] The reactivity of these functional groups was tested by specific wet-chemical modification with small molecules via amidation reaction including immobilization of COOH-modified quantum dots. Finally, the functionalized and modified graphene was transferred from copper to different substrates including glass, silicon and flexible PTFE tape.

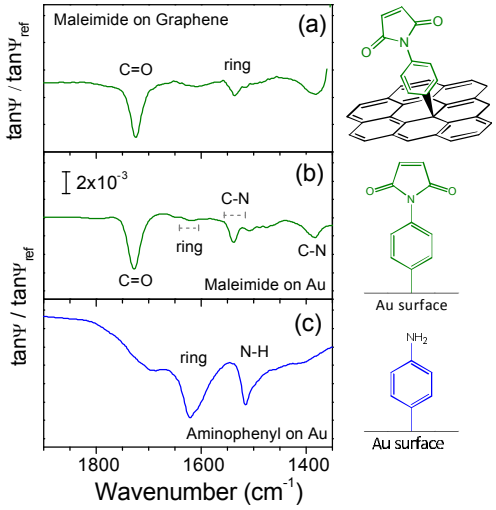

Fig. 1: IRSE spectra of Graphene (a) and Au (b,c) surfaces functionalized by maleimide (a,b) or amino (c) groups.

Keywords: Surface functionalization, biosensing, infrared-spectroscopic ellipsometry

References

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[2] F. Rösicke, M.A. Gluba, T. Shaykhutdinov, G. Sun, C. Kratz, J. Rappich, K. Hinrichs, N.H. Nickel, *Chem. Commun.* 53 (2017) 9308