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MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

seminar

Wednesday, 30th September, 9.30 am, ONLINE

Host: Dr. Maurizio Prato

Modifications of Graphene Prepared by Chemical Vapor Deposition for Diagnostic Applications

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Graphene is a carbon allotrope with a unique set of electrical, mechanical and thermal properties. For that reason, graphene has a great potential in biomedical or electronic applications. Graphene grown by Chemical Vapor Deposition (CVD) and transferred on substrate has shown to be a suitable material for these kind of applications due to its high conductivity, ambipolar behavior in field effect transistors and a good quality/price production ratio.

Since it is necessary standardization and thus commercialization, the development of reproducible measures is required. For that reason, in this thesis a cleaning protocol for CVD graphene transistors after the photolithography process was developed in order to reduce the polymeric residues of this process. The sensing properties implementation in electronic devices like graphene transistors allows the development of diagnostic tools and the treatment of different neural diseases such as epilepsy or Parkinson. With this purpose, graphene has been covalently modified by radical addition following different compatible strategies with the device design in order to anchor bioreceptors. As proof of concept, the described system was used with a selective thrombin aptamer, obtaining promising results.

In addition, the use of CVD graphene was developed in MALDI-TOF mass spectroscopy for the first time. In particular, a microarray composed by different modified sugars on graphene was developed as a diagnostic tool for protein detection. Graphene was used as surface-assisted laser desorption/ionization in mass spectrometry. This, combined with the conductive character of graphene allowed the replacement of ITO as material support and in matrix absent conditions.