Graphene-Based Technologies for Biosensors: From Field Effect Transistors to Microfibers

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Graphene based sensors have received widespread attention due to its unique properties such as high electrical conductivity and high surface area. The 2D structure of graphene allows all carbon atoms to be exposed to the surroundings, which makes it a good platform for adsorbing and detecting molecules with increased sensitivity. Graphene is also a biocompatible material, providing a good microenvironment for the immobilization of biocompounds, such as antibodies, enzymes, DNA, and aptamers. Therefore, these properties make graphene an appealing transducer material in biosensors. This presentation will provide an overview of the fundamentals and applications of graphene and its derivatives (graphene oxide (GO) and reduced graphene oxide (rGO)) in biosensors and microfibers. It will explore the development of high sensitivity devices based on graphene field effect transistors (FETs) and capacitors. Additionally, a simple method based on 3D flow focusing microfluid devices will be demonstrated to produce GO microfibers, with good control of thickness and length. Thermal and microwave treatments are also presented as an efficient tool to obtain rGO microfibers with spectroscopic and electrical properties similar to CVD graphene, that are good candidate in the development of microelectrodes.

Figures

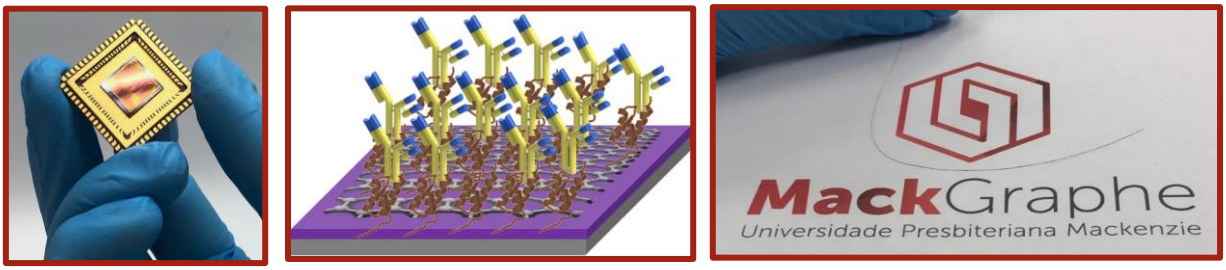

Figure 1. Biosensors based on graphene field effect transistors and capacitors. Graphene oxide fiber prepared by a microfluidic device.