

Graphene-based electronics for biomedical applications

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Graphene and graphene-based materials possess a rather exclusive set of physicochemical properties holding great potential for medical and biomedical applications. In this presentation, I will provide an overview on fundamentals and applications of several graphene-based technologies and devices, namely solution-gated field-effect transistors and microelectrode arrays based on CVD-grown graphene. I will first introduce the science and technology of such electronic devices, both on rigid and flexible substrates, discussing the influence of the intrinsic properties of CVD graphene (e.g. grain boundaries) and comparing their performance with other competing technologies. The presentation will further discuss on the functionalization of these devices aiming at the introduction of specific sensing mechanisms, which is of particular relevance for the development of chemical and biochemical sensors. Based on these technologies, I will also report on experiments aiming at the bidirectional communication with electrogenic cells as well as the detection of neurotransmitters, suggesting a bright future for graphene-based technologies in the field of neuroprosthetics.