Opportunities and Challenges of Graphene Neurotechnology in Neuroscience and Medical Applications

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Establishing a reliable bidirectional communication interface between the nervous system and electronic devices is crucial for exploiting the full potential of neurotechnology. Despite recent advancements, current technologies evidence important shortcomings, e.g. challenging high density integration of sensors, low signal-to-noise ratio, etc. Thus, efforts to explore novel materials are essential for the development of next-generation neural interfaces. Graphene and graphene-based materials possess a very attractive set of physicochemical properties holding great potential for biomedical applications, in particular for implantable neural interfaces. This presentation provides an overview on fundamentals and applications of several graphene-based technologies and devices aiming at developing an efficient bidirectional communication with the nervous system. The main goal of this talk is to discuss opportunities of graphene-based neurotechnologies in neuroscience and implantable medical applications, and at the same time to identify the main challenges ahead.