

Graphene thin film technology for neural interfaces

Jose A. Garrido

Catalan Institute of Nanoscience and Nanotechnology (ICN2), UAB Campus, 08193 Bellaterra, Barcelona, Spain
ICREA, Barcelona, Spain

joseantonio.garrido@icn2.cat

Abstract

Establishing a reliable bidirectional communication interface between the nervous system and electronic devices is critical for exploiting the full potential of neurotechnology. Despite recent advancements, current technologies evidence important shortcomings, e.g. lack of focal stimulation, 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 implantable neural interfaces.

This presentation provides an overview on the technology and applications of graphene-based thin film devices for neural stimulation and recording. It covers device architectures, microfabrication, and surface engineering for improved charge injection and noise reduction. Furthermore, this contribution summarizes in vivo performance, including spatial selectivity, chronic stability, in rodent and large-animal models.

Finally, the talk will address recent efforts toward clinical translation of this technology, including topics like scalable manufacturing, safety, and regulatory testing.

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