

Project: NeuroGraph (CSIC, ICN2, IMIM, IDIBAPS, UAB)

NeuroGraph

NeuroGraph – Monitoring of cortical depolarization in neurointensive care using graphene microtransistors.

The brain activity spans over multiple temporal and spatial scales that requires a set of technologies to advance in its understanding. Electrophysiology is consistently used to measure the brain activity due to the electrical nature of neuronal activity, and requires of an efficient transducer to record the voltage drop caused by ionic transmembrane currents in the brain tissue. Passive metallic electrodes are the most commonly used transducers. Alternatively, thanks to their unique set of properties, graphene enables the implementation of the so-called graphene based solution-gated field-effect transistor (gSGFET) as novel transducer for neural signals. The use of gSGFET is able to overcome the limitations of passive electrodes in DC coupled operation, enabling the recording of infra-slow activity (ISA). Among ISA activity, the Cortical Spreading Depression (CSD) is produced by a massive neural depolarization which is related with some neurological disorders such as migraine, epilepsy or traumatic brain injuries. The monitoring of CSD events is hampered by the limitations of current recording technology based on passive electrodes, the use of gSGFET will improve the monitoring capabilities of CSD events and may serve as diagnostic, prognostic, and treatment monitoring tools for some of these neurological disorders. The main objective of the project is advance in the translation of gSGFET technology to the clinical practice, by carrying out for first time a clinical assay in patients with traumatic brain injuries.

