Mapping infraslow brainwaves with flexible graphene transistor arrays

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Infraslow brainwaves (<0.1Hz) and more specifically, spreading depolarizations (SDs) play a significant role in brain pathophysiology [1]. However, mapping SDs with high-spatial resolution is challenging due to: i) voltage drift that can result in amplifier saturation and ii) high electrode impedance causing signal distortion [2]. For these reasons, infraslow frequencies are systematically filtered out from microelectrode neural recordings by default, which leads to loss of meaningful features. Solution-gated graphene field-effect transistors (SGFETs) are able to record, with high-fidelity, SDs alongside signals in the typical local field potential bandwidth (0.1-200Hz) [3, 4]. Using microfabricated flexible epicortical arrays of 16 gSGFETs, we validated graphene capabilities *in vivo* by mapping KCl-induced cortical spreading depression in Wistar rats both epicortically and intracortically. Considering these unique recording capabilities, we foresee gSGFETs as a promising technology for mapping infraslow brainwaves.

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References

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Figures

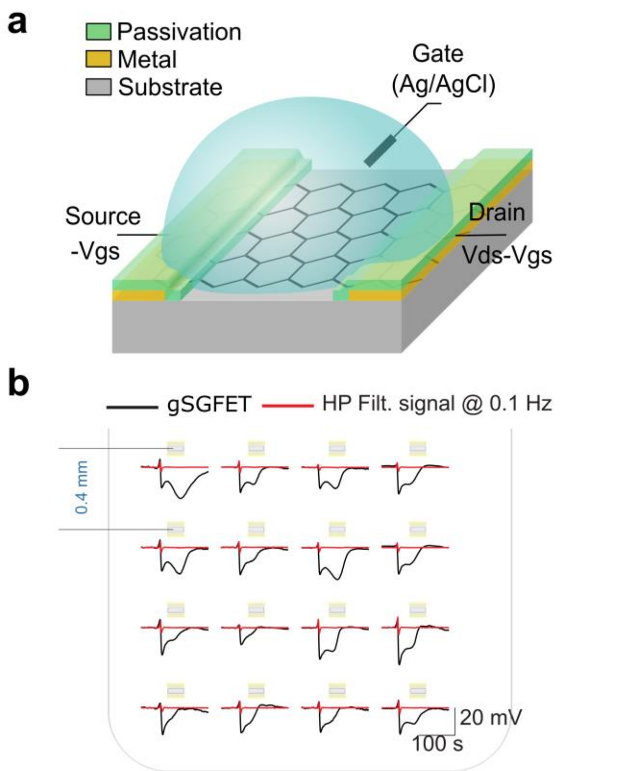

Figure 1: a) Schematic of a graphene transistor polarized in common gate mode. Vgs: gate-source voltage; Vds: drain-source voltage.
b) Recordings by a 4x4 epicortical array of 100x50-μm2 gSGFETs (black) and same signals filtered (red) during the occurrence of a SD event on rat cortex.