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In vivo recordings of brain activity using organic transistors

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In vivo electrophysiological recordings of neuronal circuits are necessary for diagnostic purposes and for brain-machine interfaces. Organic electronic devices constitute a promising candidate because of their mechanical flexibility and biocompatibility. Here we demonstrate the engineering of an organic electrochemical transistor embedded in an ultrathin organic film

designed to record electrophysiological signals on the surface of the brain. The device, tested in vivo on epileptiform discharges, displayed superior signal-to-noise ratio due to local amplification compared with surface electrodes. The organic transistor was able to record on the surface low-amplitude brain activities, which were poorly resolved with surface electrodes. This study introduces a new class of biocompatible, highly flexible devices for recording brain activity with superior signal-to-noise ratio that hold great promise for medical applications.