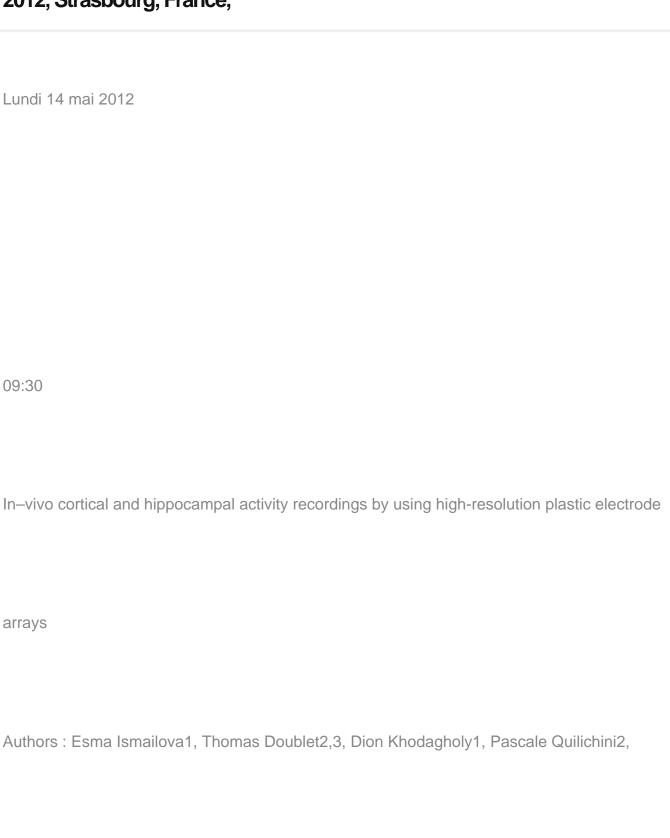


Microivtae presents 4 communications at E-MRS Conference, 14-17 may 2012, Strasbourg, France,



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Resume : The development of plastic probes for neural recordings is current and promising

subject in neuroscience research. In the case of implantable microelectrodes the rigid nature of

the probe cannot compensate the brain movements and is thus not ideal for extended in-vivo

recordings. Moreover, the week signals recorded from these probes caused by the mechanical

tissue scar and biological incompatibility between the probe and the brain slow down the

process of furthering understanding of the brain function. We developed the process to fabricate

flexible microelectrodes arrays providing high-resolution neuronal activity recordings in cortical

and hippocampal areas of a rat brain. The fabrication flow allows building the probes base on polyimide and SU-8 flexible and plastic materials. The coating of recording sites with conducting polymers opens great opportunities to improve the electrical communication between the electrode and the brain. The first in-vivo implantation shows high-resolution LFP (local field potential) signal recordings and a small glial response from histological data. These results offer promising solutions to improve the interface between the brain and the probe.





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Resume: Many challenges are presented by simultaneous recordings at multiple scales in

humans. One concerns long-term EEG (Electroencephalography) measurement during SEEG

(Stereoelectroencephalography). Today's electrodes require skin preparation and the use of

conducting gels which are not ideal for long-term recordings. One solution consists of using

conducting polymers to design a new type of dry electrode. We adapted small dry electrodes,

already used for multisite recordings in the auditory cortex in animals and polysomnographic

recordings. We discuss the influence of conducting polymer on the quality of the recordings.

Conducting polymers are naturally compatible with flexible substrates, and are known to

decrease electrode impedance and improve the quality of recordings of neuronal activity. We

used commercially available doped polythiophenes, deposited from solution. We optimized film

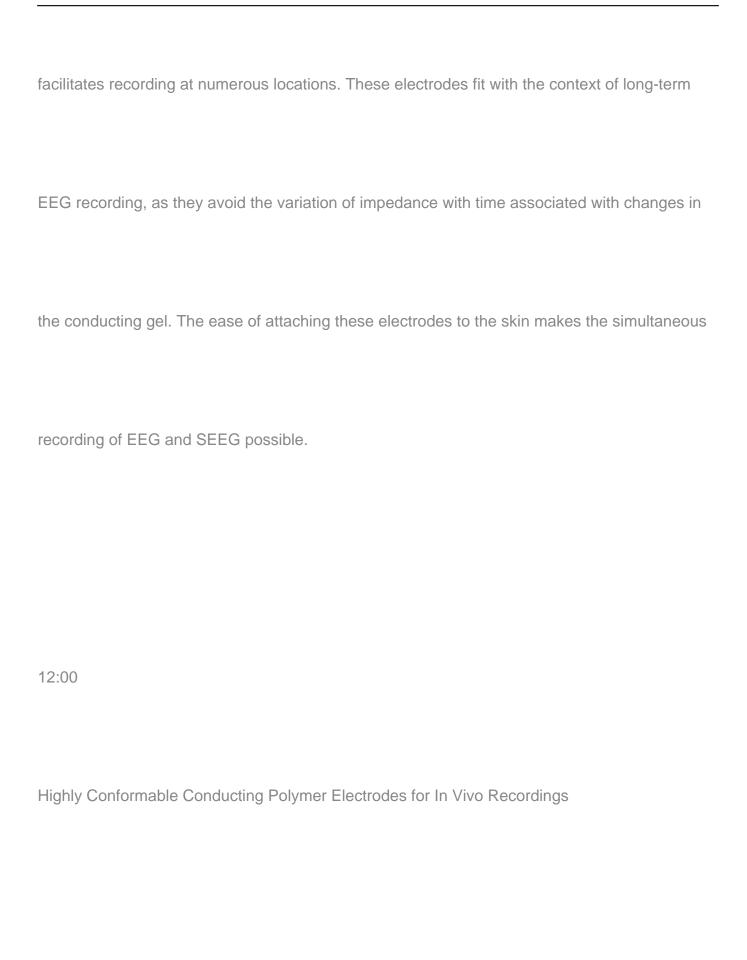
morphology by varying the deposition conditions, in an effort to minimize the impedance and

maximize the signal to noise ratio of our recordings. We show that conducting polymers are

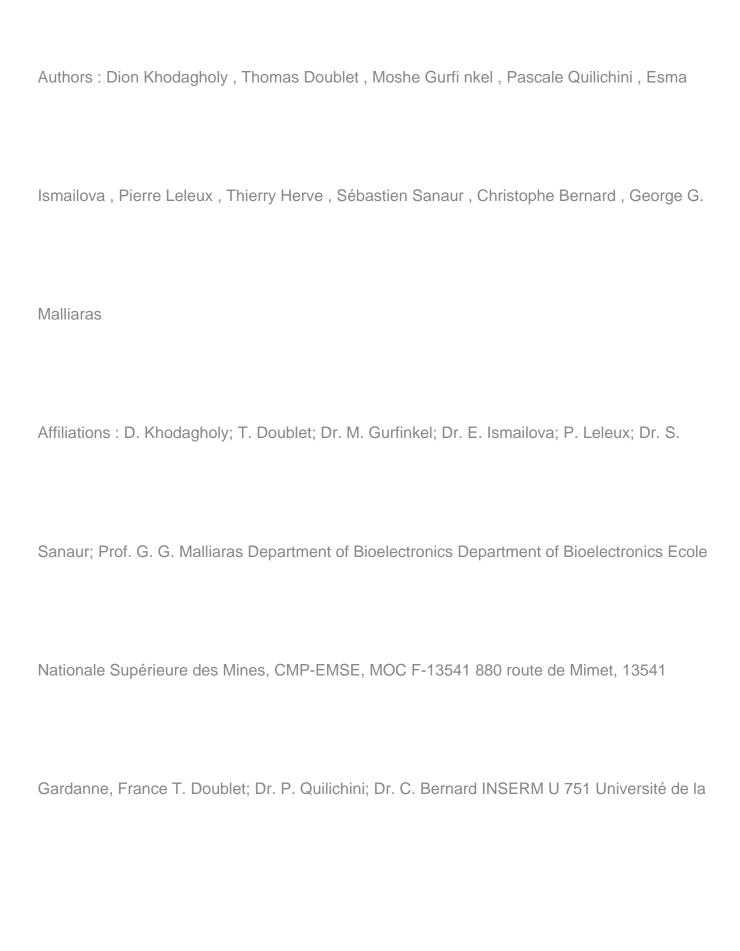
adapted to the irregular scalp surface and provide low skin-electrode interface impedance and

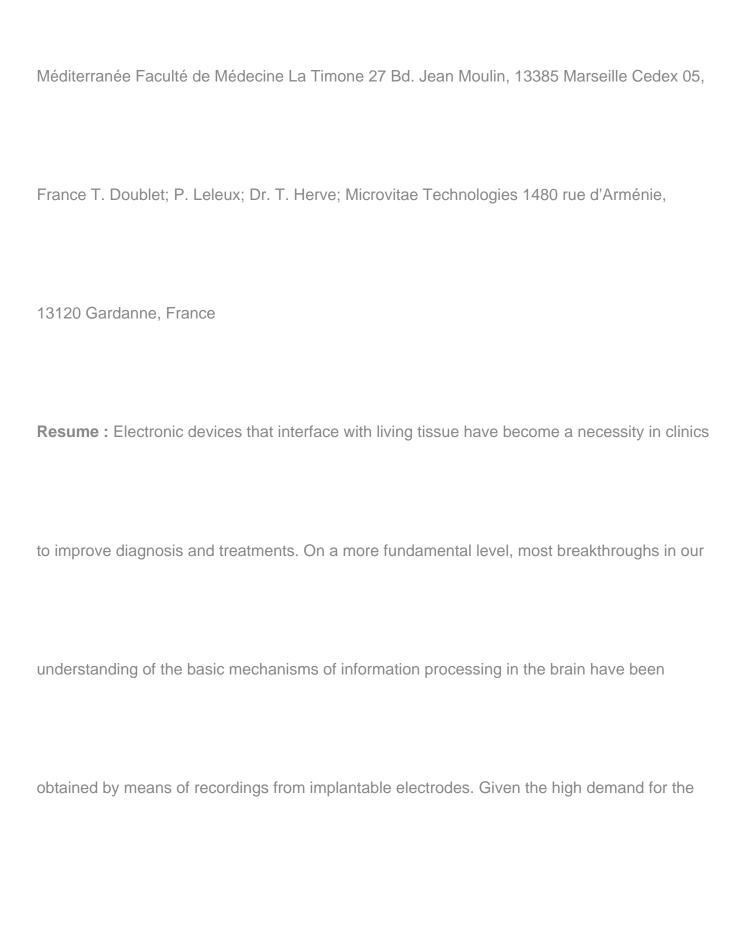


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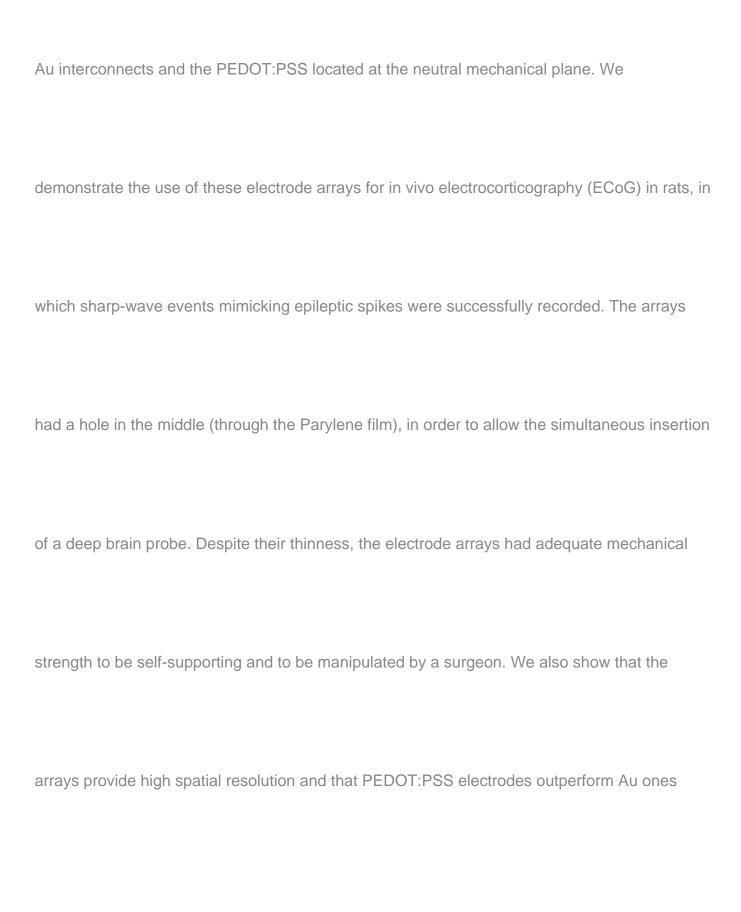


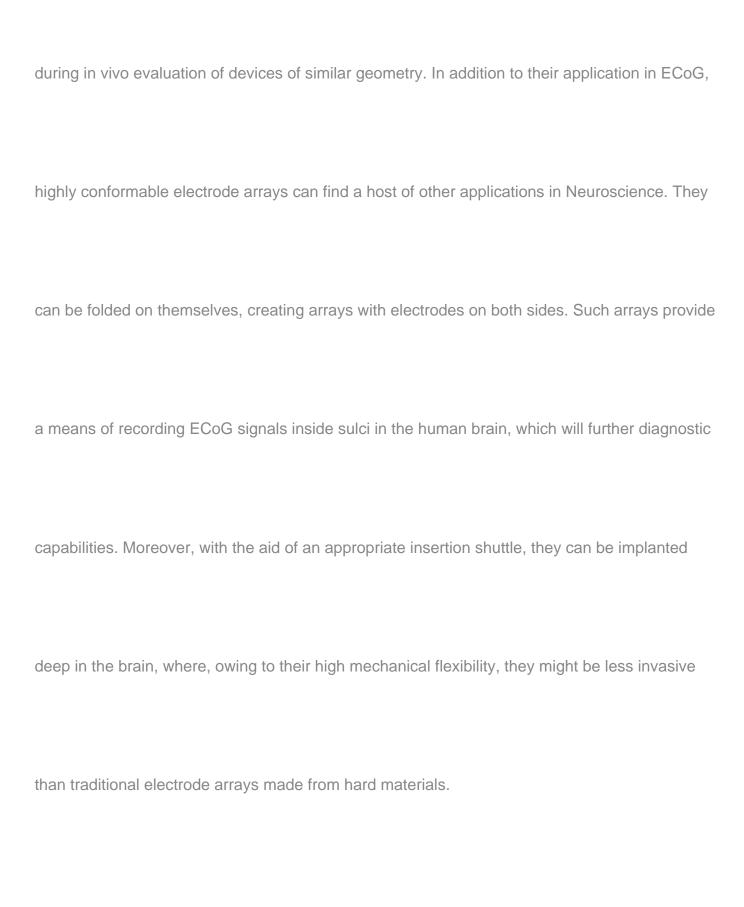




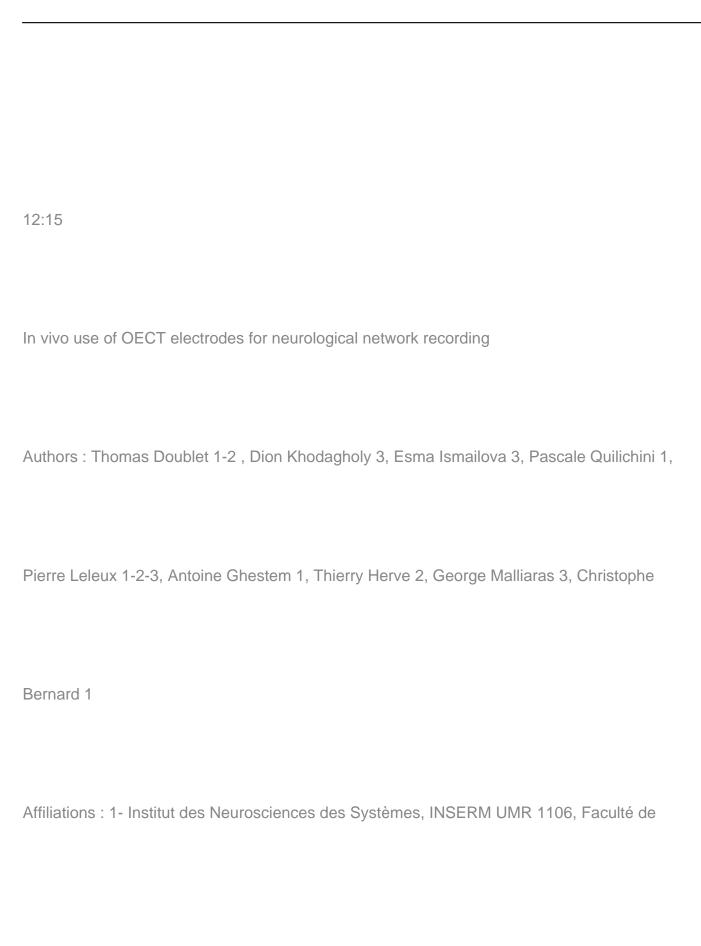


development of biocompatible and conformable electrodes and given the advantages provided by conducting polymers for neuronal interfacing, it is essential to develop general procedures for integrating conducting polymers with flexible substrates. Here, we present a generic solution to this challenge and demonstrate highly conformable electrode arrays. A photolithographic process was used to integrate the conducting polymer poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate) (PEDOT:PSS) with parylene C, yielding highly conformable electrode arrays. The array is only four micrometers thick, with the

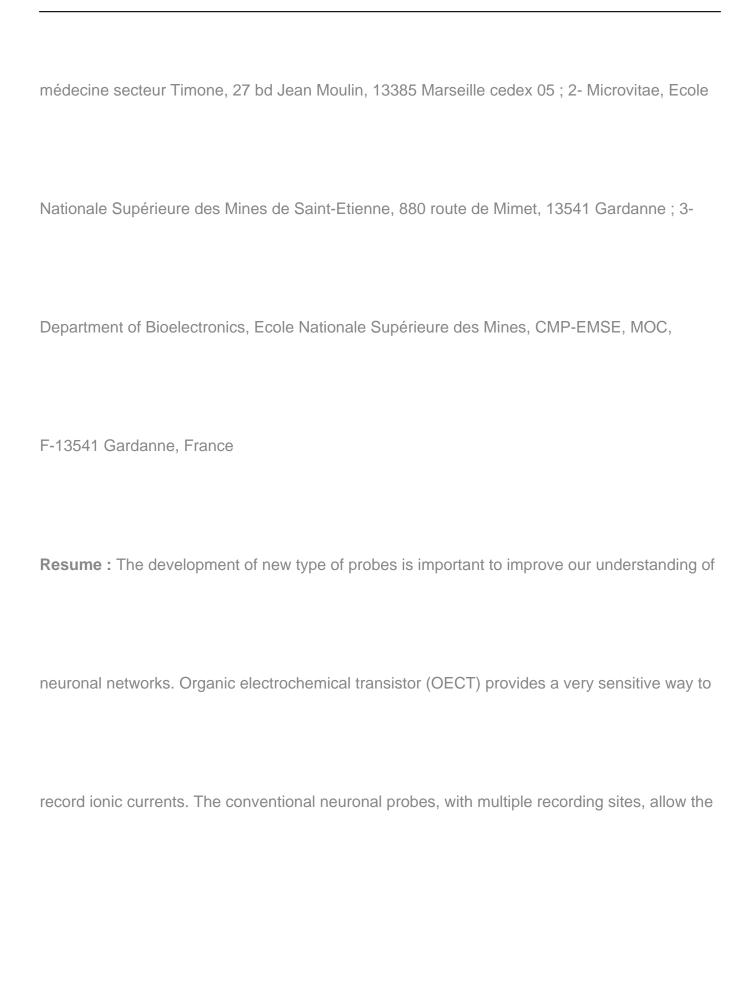




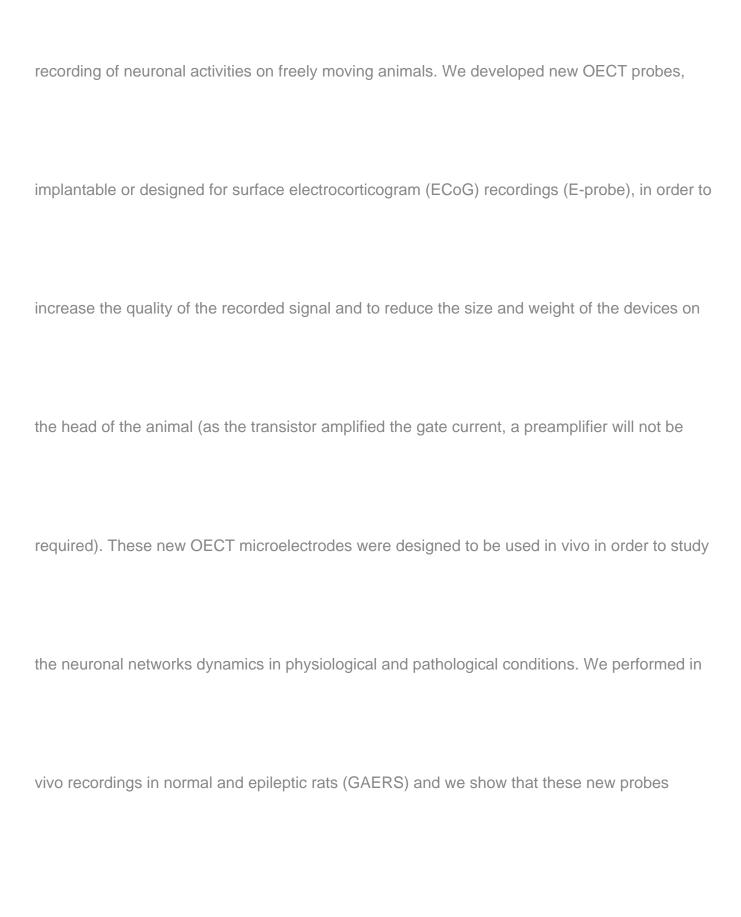








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earing high density	classical and	transistor s	ites are suited	to record	l network c	lynamics	s in vivo.