Stretchable Microelectrode Arrays for in-vitro Neural Recording and Stimulation

Host Professor Pr. T. SOMEYA
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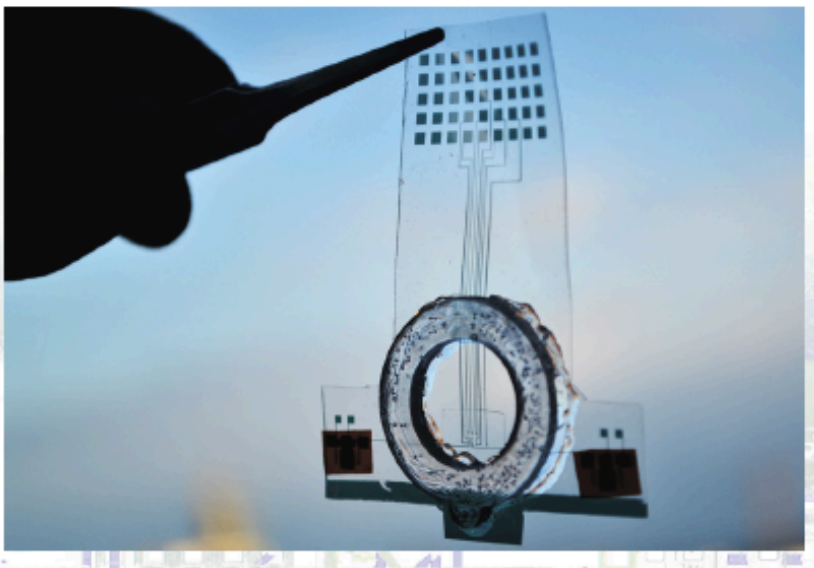
Context Due to their soft mechanical compliance to cells and biological tissue, stretchable electronics are a promising technology for a variety of neural interface applications. Specifically, stretchable microelectrode arrays (MEAs) can be used for in vitro extracellular sensing and stimulation of neurons. This novel stretchable MEA platform could be used to study neuron signaling in real time during stretching, which cannot be realized with current technologies.

Objectives In order to record neuronal signals, which have an amplitude of less than 100 micovolts, amplifiers must be used in order to maintain a high signal to noise ratio. By integrating stretchable MEAs with organic thin film transistors (TFTs), signals can be recorded directly at the neuron site to increase signal quality while maintaining mechanical compliance.

Methods Soft MEAs are fabricated using polydimethylsiloxane (PDMS) substrates and thermally evaporated microcracked gold films, which allow for stretchability. Meanwhile, TFTs are developed using DNTT, a novel organic semiconductor with high mobility.

Results Integration methods are currently being investigated.



Prototype of a soft, stretchable microelectrode array with integrated thin film transistors