Interfacing with the Brain Using Organic Electronics

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One of the most important scientific and technological frontiers of our time lies in the interface between electronics and the human brain. Interfacing the most advanced human engineering endeavor with nature's most refined creation promises to help elucidate aspects of the brain's working mechanism and deliver new tools for diagnosis and treatment of a host of pathologies including epilepsy and Parkinson's disease. Current solutions, however, are limited by the materials that are brought in contact with the tissue and transduce signals across the biotic/abiotic interface. Recent advances in electronics have made available materials with a unique combination of attractive properties, including mechanical flexibility, mixed ionic/electronic conduction, enhanced biocompatibility, and capability for drug delivery.[1] I will present examples of novel devices for recording and stimulation of brain activity that go beyond the current state-of-the-art in terms of performance, compatibility with the brain, and form factor.[2,3] I will show that modern electronic materials offer tremendous opportunities to design devices that improve our understanding of brain physiology and pathology, and can be used to deliver new therapies.[4,5]

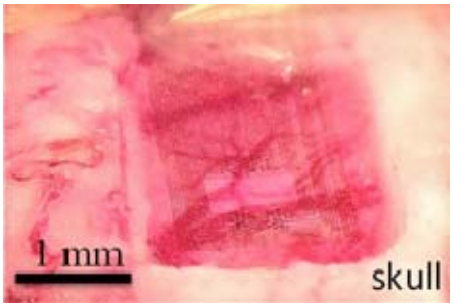

Fig. 1. Organic transistor array recording epileptic seizures from the cortex of a rat

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