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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. The field of organic electronics has made available materials with a unique combination of attractive properties, including mechanical flexibility, mixed ionic/electronic conduction, enhanced biocompatibility, and capability for drug delivery. I will present examples of organic-based devices for recording and stimulation of brain activity, highlighting the connection between materials properties and device performance. I will show that organic electronic materials provide unparalleled opportunities to design devices that improve our understanding of brain physiology and pathology, and can be used to deliver new therapies.