The abilities to reliably record from a large ensemble of neurons in the brain, to map their functional connectivity and to track their activity over chronic time scale are of paramount importance to both basic and clinical neuroscience, as brain functions are realized by coordinated activation of neuronal populations. Implanted electrodes provide one of the primary neurotechniques by allowing for time-resolved acquisition from individual neurons. However, the recording stability and density of conventional neural electrodes pose major limitations on their scientific and clinical applications.

We recently demonstrated that ultraflexible, cellular-sized neural electrodes afford seamless integration with the brain tissue and reliable recording of individual neurons for several months. Building upon this strategy, we further demonstrate the potentials of scaling up this platform and monitoring neuronal clusters, as well as functional mapping and chronic tracking of the local circuitry over several months in behaving brains.

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