Abstract Submitted
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Vertical nanowire electrode array: a highly scalable platform for intracellular interfacing to neuronal circuits MARSELA JORGOLLI, Department of Physics, Harvard University, JACOB ROBINSON[1], ALEX SHALEK, Department of Chemistry and Chemical Biology, Harvard University, MYUNG-HAN YOON, Gwangju Institute of Science and Technology, RONA GERTNER, Department of Chemistry and Chemical Biology, Harvard University, HONGKUN PARK, Department of Chemistry and Chemical Biology and Department of Physics, Harvard University — Interrogation of complex neuronal network requires new experimental tools that are sensitive enough to quantify the strengths of synaptic connections, yet scalable enough to couple to a large number of neurons simultaneously. Here, we will present a new, highly scalable intracellular electrode platform based on vertical nanowires that affords parallel interfacing to multiple mammalian neurons. Specifically, we show that our vertical nanowire electrode arrays can intracellularly record and stimulate neuronal activity in dissociated cultures of rat cortical neurons and be used to map multiple individual synaptic connections. This platform's scalability and full compatibility with silicon nanofabrication techniques provide a clear path toward simultaneous high-fidelity interfacing with hundreds of individual neurons, opening up exciting new avenues for neuronal circuit studies and prosthetics.

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