ELECTRO-PLASMONIC NANOANTENNA FOR MASSIVELY PARALLEL WIRELESS ELECTROPHYSIOLOGICAL RECORDINGS WITH SUBCELLULAR RESOLUTION

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ABSTRACT: Traditionally, electrophysiological measurements are performed using electrical electrodes. Harvesting photons for electrophysiological studies, on the other hand, can provide unprecedented spatiotemporal resolution and multiplexing capabilities. Yet, progress towards that goal remains elusive due to lack of electro-optic translators that can efficiently convert bioelectronic signals to high photon-count optical ones. In this talk, I will introduce an ultrasensitive, nanoscale and electro-plasmonic nanoantenna enabling wireless measurement of electrophysiological signals with subcellular resolutions (3 million electrodes/mm_2). In our in vitro experiments, we showed 20 million simultaneous electrophysiological recordings over 100,000 cells, reflecting a technical capability well beyond the current microelectrode technologies.

BIO: A. Ali Yanik is an Assist. Professor in the Baskin School of Engineering at the University of California, Santa Cruz. His research interests include nanoplasmonic and metamaterial devices for ultrasensitive spectroscopy of biomolecules/chemicals as well as high-throughput, cost effective, BioNEMS technologies for life sciences, point-of-care diagnostics and global health. He received his Ph.D. degree in physics from Purdue University. Before joining to UCSC, he was a postdoctoral fellow at NIH BioMEMS Center at Harvard University Medical School and the Department of Surgery in Massachusetts General Hospital. He published more than 100 peer reviewed journal articles and conference proceedings. He received NSF CAREER Award in 2019.