

Integrated Systems

Worth the Squeeze: Power and Packaging Approaches for Biosensors and Bioelectronics

Dr. Matthew Johnston

Associate Professor, Oregon State University

Date: Friday, November 15th, 2024, Time: 2:00pm, Location: EEB 132

Zoom Meeting Link: <https://usc.zoom.us/j/96947583326>

Refreshments will be served

Abstract: The integration of new materials, sensing modalities, and intelligence in CMOS-based sensor platforms will enable a broad range of miniaturized diagnostic, therapeutic, and monitoring systems. In addition, such devices will require new approaches for long-term powering and operation that avoid battery replacement/recharging. Achieving these goals will require continued chip-level and system-level advancements, as well as new integration and packaging approaches. In this talk, I will focus on two challenges: 1) Thermoelectric energy harvesting applied to wearable devices, including true battery-less, bioelectronic sensors powered by body heat, as well as other ultra-low-power sensors for chemistry and biology; and, 2) emerging Lab-on-CMOS platforms enabled by IC-based sensors and advanced packaging techniques that combine electronics and microfluidics in a single substrate for biosensing applications.

Biography:



Dr. Matthew Johnston received the B.S. degree in electrical engineering from the California Institute of Technology, and the M.S. and Ph.D. degrees in electrical engineering from Columbia University. He was a Co-Founder and Manager of Research with Helixis, a Caltech-based spinout developing instrumentation for real-time PCR, from 2007 to its acquisition by Illumina in 2010. Dr. Johnston joined Oregon State University in 2014, where he is currently an Associate Professor with the School of Electrical Engineering and Computer Science. His research interests include the integration of sensors and transducers with silicon CMOS integrated circuits, lab-on-CMOS platforms, ultra-low-power sensors, stretchable circuits, and bio-energy harvesting. Dr. Johnston was the recipient of the 2020 Semiconductor Research Corporation (SRC) Young Faculty Award. He is currently an Associate Editor of the *IEEE Transactions on Circuits and Systems II*, and he has also served as an Associate Editor for the *IEEE Open Journal of Circuits and Systems* and the *IEEE Transactions on Biomedical Circuits and Systems*.

Hosted by Profs. Hossein Hashemi, Mike Chen and Constantine Sideris

Organized by Soumya Mahapatra (smahapat@usc.edu)

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