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Seminar Presentation: 10:00am – 11:00am
Cymer Conference Center, SME 248

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Integrated Flexible Technologies for Wearables and Cortical Implants

Abstract:
This talk will address two challenges in wearable and implanted devices: power and biocompatibility. For skin wearables, we introduce a novel monolithic integration scheme for demonstrating process-compatible energy harvesting on the same wearable system on chip. The devices feature side-by-side solar cells, transistors and electrophysiological sensors, paving the way for health data telemetry in the RF frequency domain from light-powered wearables. For implantable devices, we developed high fidelity and high-density electrocorticography (ECoG) sensors on thin, conformal and transparent substrates. Through systematic electrochemical, aging, and sterilization studies, we determined the scaling effects on performance of inorganic (Au, Pt) and organic (PEDOT:PSS) microelectrodes in the different brain activity frequency regimes to predict the limits in the spatiotemporal resolution of ECoG recording and stimulating devices. We will present results on intraoperative monitoring from human subjects performing tasks and discuss their prospects for stable neuroprosthetic implants.

Biosketch:
Shadi received his PhD degree in Electrical Engineering from the University of California San Diego in 2008. He then joined Los Alamos National Laboratory where he helped build and co-lead the nanowire program at Los Alamos. He returned to UC San Diego in 2012 to build a group that works at the interface of electronic materials and biological tissue. His group pioneers diverse fields in heteroepitaxy, contact metallurgy, sensors, and bioelectronics devices.