



Institute for Materials Science

UNCLASSIFIED

IMS Rapid Response 2016 * Phase II Recipient Seminar



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Integrated Flexible Technologies for Wearables and Cortical Implants

Thursday, August 11, 2016

2:00 p.m. - 3:00 p.m.

Sig Hecker Conference Room (TA3 - 0032 room 134)

Abstract: Mutating high technologies with portable and flexible features that can be worn by or implanted into a user can lead to unprecedented applications, connect objects together and increase the interaction between technology and human body. By leveraging advanced sensors and wireless modules, wearables enable personalized medicine by providing continuous monitoring of individual's health through sampling human's sweat, tracking the heart rate and acquiring other vital signs. 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 technique 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 sensors on thin, conformal and transparent substrates. We carried out systematic electrochemical, aging, and sterilization studies to reveal the scaling effects on performance of inorganic (Au, Pt) and organic (PEDOT:PSS) microelectrodes. Intraoperative recording from human subjects performing tasks will be presented.

Bio: Shadi received his Maitrise in Physics/Electronics from the Lebanese University in 2001, and the PhD degree in Electrical Engineering from the University of California San Diego in 2008. He joined Los Alamos National Laboratory and worked with Tom Picraux at CINT on Si/Ge heterostructure nanowires. He returned to UC San Diego in 2012 to build a group that works at the interface of electronic materials and biological tissue. His students are progressing diverse fields in heteroepitaxy, contact metallurgy, sensors, and bioelectronics devices.

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*Hosted by Alexander Balatsky * Director of the Institute for Materials Science*