

Seminar Announcement

Ultra-Thin and Ultra-Flexible Organic Bio-Electronic Medicines

Robert Nawrocki

ECE 202, 11am

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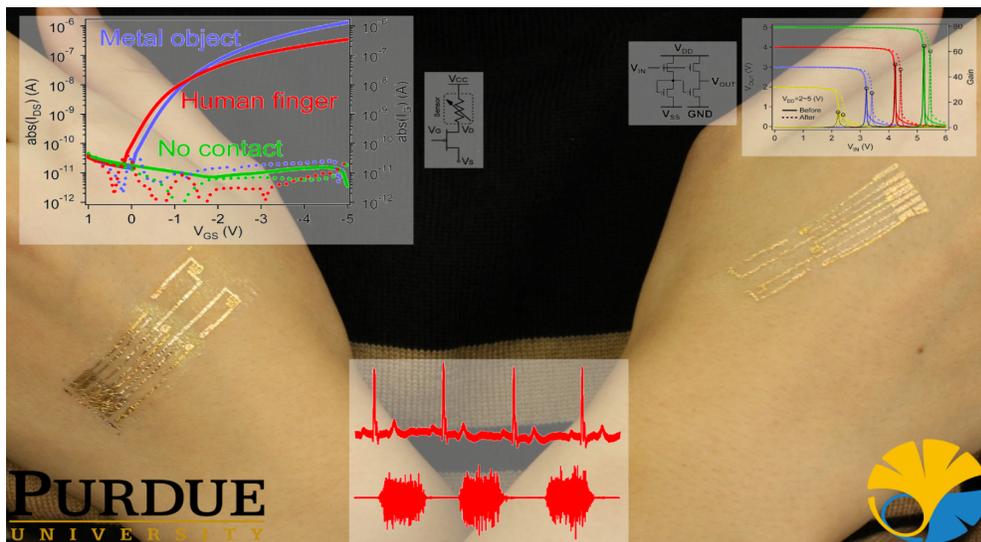
Abstract: Bioelectronics is an emerging field that aims to bridge the gap between the fields of biology and electronics, for the purposes of augmenting or replacing current approaches to health care. It involves the study of fields as biology and electronics as well as chemistry, physics, and material science.

One of the candidates for the implementation of bioelectronics is organic electronics, carbon-based materials that conduct electricity. They promise to address various shortcomings of currently ubiquitous inorganic (silicon-based) electronics, such as physical flexibility, biocompatibility, large area fabrication, and rapid prototyping (roll-to-roll and inkjet printing).

Currently one of the most pressing bioelectronics needs is the ability to imperceptibly and accurately monitor and process the information from various biomarkers, such as surface electromyogram (sEMG), surface electrocardiogram (sECG), temperature, skin hydration, skin pH, glucose, etc. On-skin deployment of ultra-thin and conformal monitoring equipment is necessary for imperceptible, high-fidelity (SNR), and long-term measurement.

This presentation will describe the advances in ultra-thin and ultra-flexible biosensors and bioelectronics. Organic electronics transistors (p- and n-type) and circuits (inverters, amplifiers, ring oscillators) were demonstrated at less than 300 nm thin, including top and bottom encapsulation layers. Mechanical testing revealed unprecedented physical flexibility, ultra-light weight, and biocompatibility. Fabrication-compatible high fidelity biosensors (sEMG and sECG) showed similar mechanical form factor. Motion artifact-free monitoring has been demonstrated.

Bio: Robert A Nawrocki is an assistant professor at Purdue University. He completed his undergraduate studies in Computer Engineering at NJIT, and his graduate education in Computer and Electrical Engineering at University of Denver. He also completed his graduate research internship at Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland under prof. Bradley Nelson. Prior to his Purdue appointment, he conducted his postdoctoral studies at University of Colorado Boulder, University of Nova Gorica in Slovenia, and University of Tokyo, Japan under prof. Takao Someya.



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