Rice University
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Department of Chemical and
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Presents

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Flexible Sensors to Yield Thermal Properties of Skin; and a New Path to Polyolefin Elastomers

The development and application of soft, conformal electronic sensors for use at the biological interface (e.g. thermal sensors for skin, flexible strain gauges, blood flow monitors) toward real-time monitoring of physiological phenomena have become of increasing interest as we approach the age of wearable electronics. One example in particular, is to employ basic principles of epidermal electronics toward the micro-fabrication of thermal sensors that are designed to measure the local thermal conductivity and temperature changes of skin with milli-Kelvin precision. The goal is to gain useful information about the vasculature of the underlying tissue – a critical detail when considering dynamic skin conditions such as diabetic ulcers, athletic injury and beyond.

In a parallel topic, the encapsulating elastomeric substrate is a critical component related to the durability and conformal nature of implantable flexible-electronics. Here, an alternative synthetic route is considered toward the development of a new class of polyolefin thermoplastic elastomers. The goal is to target the macroscopic materials properties of interest – low modulus elastomers – then systematically tune the microscopic contribution of polymer chains (i.e. molecular structure and microphase separation) to achieve the desired bulk behavior from the bottom-up.

About the Speaker

Dr. Crawford is currently a postdoctoral researcher with joint affiliation at the Northwestern University Center for Bio-integrated Electronics, and the University of Illinois, Urbana-Champaign Department of Materials Science and Engineering, both within the research group of Prof. John Rogers. In the Rogers group, Dr. Crawford is engaged in cross-disciplinary research that involves flexible electronics, materials chemistry, and engineering for use in a wide range of translational human health applications. She received her Ph.D. in Chemistry at the University of Maryland, College Park in consultation with Prof. Lawrence Sita in 2015. Her doctoral work was focused on modulating the chemical architecture of polyolefin block copolymers for use as thermoplastic elastomers. Prior to that, Dr. Crawford received her M.S. in Chemistry at the North Carolina State University with Prof. Christopher Gorman in 2009 with research emphasis on biodegradable polymer brushes. She holds dual B.S. degrees in Chemistry and Psychology from the University of North Carolina, Charlotte. Over the years of academic training Dr. Crawford has received numerous awards in research and teaching, of which she is the recipient of the 2015 Board of Visitors Outstanding Graduate Research award from the College of Computer, Mathematical, and Natural Sciences at the University of Maryland – the highest graduate student accolade within that College.