IOWA STATE UNIVERSITY
Department of Mechanical Engineering

Edible Electronics: Bioinspired Materials and Structures for Next-Generation Ingestible Devices

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Seminar host: Reza Montazami

Abstract

Ingestible electronic devices have the potential to obviate many of the challenges associated with chronic implants such as risk of infection, chronic inflammation, and costly surgical procedures. Examples of ingestible electronics include edible cameras, ingestible event monitors, and integrated smart drug delivery systems. Ingestible devices have made great advances in the early detection and improved treatment of disease by using commodity polymers and off-the-shelf electronic components. However, currently available materials fundamentally limit how these devices can be used. The potential clinical impact of ingestible electronics could be increased by expanding the application-specific materials toolbox for this class of medical devices. This talk will describe recent advances in bioinspired materials for potential use in edible devices. Examples include flexible biodegradable elastomers as structural polymers and melanin-based pigments as materials for on-board energy storage. Structure-property-processing relationships for these medical materials will be emphasized and prospective uses for these application-specific materials will be discussed.

Christopher Bettinger is currently an Assistant Professor at Carnegie Mellon University in the Departments of Materials Science and Engineering and Biomedical Engineering. He directs the laboratory for Biomaterials-based Microsystems and Electronics at CMU, which is broadly interested in the design of novel materials and interfaces that promote the integration of medical devices with the human body. Recent efforts focus on addressing materials challenges in the design and deployment of edible electronics for diagnostics and therapeutics. He has received honors including the National Academy of Sciences Award for Initiatives in Research, the ACS AkzoNobel Award for Polymer Chemistry, the MIT Tech Review TR35 Top Young Innovator under 35, and the DARPA Young Investigator Award. Prof. Bettinger is also a co-inventor on several patents and was a finalist in the MIT $100K Entrepreneurship Competition. Prof. Bettinger received an S.B. in Chemical Engineering, an M.Eng. in Biomedical Engineering, and a Ph.D. in Materials Science and Engineering as a Charles Stark Draper Fellow, all from the Massachusetts Institute of Technology. He completed his post-doctoral fellowship at Stanford University in the Department of Chemical Engineering as an NIH Ruth Kirschstein Fellow.

This seminar counts towards the ME 600 seminar requirement for Mechanical Engineering graduate students. www.me.iastate.edu