

Chemical Engineering Doctoral Defense

Material Processing for Edible Electronics

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abstract

A new type of electronics was envisioned, namely edible electronics. Edible electronics are made by FDA certified edible materials which can be eaten and digested by human body. Different from implantable electronics, test or treatment using edible electronics doesn't require operations and perioperative complications. This dissertation bridges the food industry, material sciences, device fabrication, and biomedical engineering by demonstrating edible supercapacitors and electronic components and devices. In Chapter 2, edible supercapacitors were fabricated to power a snake camera and kill bacterial. In Chapter 3, a "preferred food kit" was created for component fabrication. Some edible electronic components, such as wires, resistor, inductor, etc., were developed and characterized utilizing the preferred food kit. These components make it possible to fabricate edible electronic/device in the future work. In Chapter 4, edible pH sensor was introduced and fabricated. Edible pH sensor can be swallowed and test pH value of gastric fluid and send the signal wireless within a few sec. In Chapter 5, an edible gel electrolyte was developed as a side project for the edible supercapacitor.

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