



Consortium for Wound Healing Research and Education

Seminar Series

Biocompatible Piezoelectric Film Sensors: Potential Applications

Hanz Richter, Ph.D.

Assistant Professor & Graduate Director
Mechanical Engineering Department
Cleveland State University

Monday, March 30, 2009

3:30 PM

Eva Craig – Frasche Classroom
Akron General Medical Center

(Take the hospital green elevators to floor G and go down the hallway
straight ahead and follow it to the end)

Abstract

Polymeric materials of biological origin have been known to exhibit piezoelectricity, pyroelectricity, and electro-optical activity for more than 5 decades. In particular, the piezoelectric effect has been demonstrated in materials like bone, cellulose, collagen and a variety of polysaccharides of current biomedical interest.

Many of these naturally-occurring materials have gained importance in biomedical applications due to their biocompatibility, biodegradability, natural adherence to tissue, and in the case of chitosan, healing properties. In addition, these materials can be manufactured to have excellent mechanical properties. The presence of piezoelectricity makes these materials even more attractive as electromechanical sensors for biomedical and other applications.

In this talk, initial experiments are discussed that demonstrate strain sensing using a particular biopolymer -chitin- as the base material. Chitin and its derivative chitosan are amazingly versatile polymers. Aside from their piezoelectric properties, these materials have found many applications in industry and medicine. Chitin is found naturally in the shells of crustaceans like lobsters and crabs and in the exoskeletons of other arthropods like ants and beetles. A remarkable property of chitosan is that it is biocompatible, and further, it accelerates the wound healing process. For this reason, it is used in wound and burn dressings for humans and animals. It is also used as an absorbable suture, exploiting its mechanical strength, biodegradability and biocompatibility. The talk also discusses similar efforts carried by researchers and the next steps to be taken to advance this technology.