

Transient Electronic Systems in Medicine

John A. Rogers

Northwestern University, jrogers@northwestern.edu, <https://rogersgroup.northwestern.edu/>

Abstract

A remarkable feature of modern integrated circuit technology is its ability to operate in a stable fashion, almost indefinitely, without physical or chemical change. Recently developed classes of electronic materials create an opportunity to engineer the opposite outcome, in the form of ‘transient’ devices that dissolve, disintegrate, degrade or otherwise physically disappear at triggered times or with controlled rates. Water-soluble classes of transient electronic devices serve as the foundations for applications in zero-impact environmental monitors, ‘green’ consumer electronic gadgetry and bio-resorbable medical implants. This talk describes the foundational concepts in materials science, electrical engineering and assembly processes for bio/ecoresorbable electronics in a variety of formats and with a range of functions. Wireless stimulators that accelerate neuroregeneration of injured peripheral nerves and pacemakers that minimize risks after cardiac surgeries represent some recent system level examples.

Short Biography

Professor John A. Rogers began his career at Bell Laboratories as a Member of Technical Staff in the Condensed Matter Physics Research Department in 1997, and served as Director from the end of 2000 to 2002. He then spent thirteen years at the University of Illinois, as the Swanlund Chair Professor and Director of the Seitz Materials Research Laboratory. In 2016, he joined Northwestern University as the Simpson/Querrey Professor, where he is also Director of the Institute for Bioelectronics. He has co-authored nearly 900 papers and he is co-inventor on more than 100 patents. His research has been recognized by many awards, including a MacArthur Fellowship (2009), the Lemelson-MIT Prize (2011), the Smithsonian Award for American Ingenuity in the Physical Sciences (2013), the Benjamin Franklin Medal (2019), and a Guggenheim Fellowship (2021). He is a member of the National Academy of Engineering, the National Academy of Sciences, the National Academy of Medicine and the American Academy of Arts and Sciences.

