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Soft Electronics for the Human Body

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ABSTRACT:

Biology is soft, curvilinear and transient; modern semiconductor technologies are rigid, planar and everlasting. Electronic and optoelectronic systems that eliminate this profound mismatch in properties create opportunities for devices that can intimately integrate with the body, for diagnostic, therapeutic or surgical function with important, unique capabilities in biomedical research and clinical healthcare. Over the last decade, a convergence of new concepts in mechanical engineering, materials science, electrical engineering and advanced manufacturing has led to the emergence of diverse, novel classes of 'biocompatible' electronic platforms. This talk describes the key ideas, with examples ranging from wireless, skin-like electronic 'tattoos' for continuous monitoring of physiological health, to flexible, millimeter-scale wireless devices for authentication and environmental sensing, to bioresorbable intracranial sensors for treating traumatic brain injury.

BIOGRAPHY:

Professor John A. Rogers obtained BA and BS degrees in chemistry and in physics from the University of Texas, Austin, in 1989. From MIT, he received SM degrees in physics and in chemistry in 1992 and the PhD degree in physical chemistry in 1995. From 1995 to 1997, Rogers was a Junior Fellow in the Harvard University Society of Fellows. He joined Bell Laboratories as a Member of Technical Staff in the Condensed Matter Physics Research Department in 1997, and served as Director of this department from the end of 2000 to 2002. He then spent thirteen years on the faculty at University of Illinois, most recently as the Swanlund Chair Professor and Director of the Seitz Materials Research Laboratory. In 2016, he joined Northwestern University as the Louis Simpson and Kimberly Querrey Professor of Materials Science and Engineering, Biomedical Engineering and Medicine. His research has been recognized by many awards including a MacArthur Fellowship (2009), the Lemelson-MIT Prize (2011), the MRS Mid-Career Researcher Award (2013), the Smithsonian Award for American Ingenuity in the Physical Sciences (2013), and the ETH Zurich Chemical Engineering Medal (2015). He is a member of the National Academy of Engineering, the National Academy of Sciences, the National Academy of Inventors and the American Academy of Arts and Sciences.