Carnegie Mellon
Materials Science and Engineering Seminar Series

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"Materials for Stretchable Electronics: From Hemispherical Digital Imagers to Devices for Cardiac Electrophysiology"

Friday, September 11, 2009
10 A.M. Seminar in Baker Hall 136A

Electronic systems that involve transistors and other components on thin plastic or rubber substrates offer mechanical properties (e.g. bendability, stretchability) and other features (e.g. rugged, lightweight construction; curvilinear shapes) that cannot be achieved with conventional technologies. Examples of new device possibilities include electronic eyeball cameras and personal health monitors, where the electronics must conform to curved surfaces and flex/stretch during use. This talk describes the use of nanomaterials in integrated circuits that offer the electronic performance of state-of-the-art, wafer-based devices but with the mechanical properties of a rubber band. We explain the materials science and mechanics of these approaches, as well as aspects of their use in various electronic systems. Cardiac and brain monitoring devices provide examples of applications in biomedicine; hemispherical electronic eye imagers illustrate the capacity for bio-inspired device design.

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 2000-2002. He currently holds the Lee J. Flory-Founder Chair in Engineering at University of Illinois at Urbana/Champaign with a primary appointment in the Department of Materials Science and Engineering

Rogers' research includes fundamental and applied aspects of nano and molecular scale fabrication as well as materials and patterning techniques for unusual format electronic and photonic systems. He has published ~250 papers, and is co-inventor on >70 patents and patent applications, more than 40 of which are licensed or in active use by large companies and startups. His research has been recognized with many awards including, most recently, the IEEE George Smith Award for the best paper in IEEE Electron Device Letters (2009), the National Security Science and Engineering Faculty Fellowship from the Department of Defense (2008), the Daniel Drucker Eminent Faculty Award from the University of Illinois (2007) and the Leo Hendrick Baekeland Award from the American Chemical Society (2007). He is a Fellow of the American Physical Society (2006), the Materials Research Society (2007) and the American Association for the Advancement of Science (2008).