University of Rochester
Department of Electrical and Computer Engineering
Colloquia Series

Using Spatial Atomic Layer Deposition for "Printed" Thin Film Electronics

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Wednesday, October 22nd
11:50 AM – 12:50 PM
Computer Studies Building (CSB) 209

Abstract: I will describe novel thin film electronics, based on metal-oxide materials, with architectures that are enabled by spatial Atomic Layer Deposition (SALD). SALD is a deposition process performed at atmospheric pressure that can grow coatings very quickly. In one approach we fabricate devices using selective area deposition, with inkjet-printed inhibitor, to additively pattern all the active layers. We build full transistors and circuits using one inhibitor ink, the SALD system, and an oxygen plasma to clean the substrate. Performance of the resulting transistors and circuits match photolithographically patterned ones, with mobility above 10 cm2/V-s, but the digital design allows us take a desktop layout to completed circuits in hours. In the second approach we use the well-known conformality of ALD to build self-aligned, sub-micron channel length, vertical transistors. The vertical transistor electrical performance is impressive compared to amorphous silicon TFTs, for example, yet the alignment tolerances inherent in the fabrication process are large. We discuss materials and device design considerations for each of these approaches. Acknowledgment: Carolyn Ellinger, and Lee Tutt

Bio: Shelby F. Nelson is a Senior Research Scientist in the Aligned Technology Center at Eastman Kodak Company. At Kodak she has worked primarily on thin-film electronics and on inkjet printer head design. She received the Ph.D. degree from Cornell University in Applied Physics, and has worked on silicon/germanium heterostructures at IBM's Thomas J. Watson Research Center, has been the Clare Booth Luce Assistant/Associate Professor of Physics at Colby College, and has worked at Xerox Corporation as a semiconductor device physicist modeling power transistors in a mixed-signal CMOS process for ink-jet ejector heads. She has been at Kodak since 2001.

Light refreshments will be provided