The Information Science & Technology Center

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Colorado State University's
Information Science and Technology Center (ISTeC)
presents <u>two</u> lectures by

Dr. Franco Cerrina

Professor and Department Head
Electrical and Computer Engineering
Boston University

ISTeC Distinguished Lecture

in conjunction with the
Electrical and Computer Engineering Department and
Computer Science Department Seminar Series

"Photons at Work: From Silicon to DNA and Back"

Monday, October 5, 2009
Reception: 10:30 a.m.
Lecture: 11:00 – 12:00 noon
Location: Lory Student Center Room 224

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Special Electrical and Computer Engineering Seminar

sponsored by ISTeC

"Patterning at the Nanoscale: Extreme Ultraviolet Lithography"

Tuesday, October 6, 2009
Lecture: 9:00 a.m. – 10:00 a.m.
Location: Lory Student Center Room 210

ABSTRACTS

"Photons at Work: From Silicon to DNA and Back"

This talk will review the research activity in the area of nanofabrication, covering a broad spectrum from semiconductor technology to DNA-based fabrication. Recently lithography has been extended to biological problems, in what can be termed Biological Lithography. Lithographic techniques applied to biological problems includes "gene synthesis" process whereby the oligomers synthesized are harvested from the surface, amplified and stepwise assembled in longer constructs. "Synthetic genes" can be used to encode biological functions, or to enable the use of DNA as structural material. The sequence of bases in DNA encodes the genetic information, but DNA itself can be used as a "structural building" block where the sequence information is used for "smart" assembly of structures of various shapes.

"Patterning at the Nanoscale: Extreme Ultraviolet Lithography"

This talk will describe the research activity in the area of semiconductor lithography, specifically the design and performance of Extreme Ultraviolet Interference Lithography and Holography (EUV-IL and HL) setup operating at 13:4 nm. This activity is geared to support the development of novel photoresist materials for the 50-10 nm domain lithography nodes of the ITRS.

Since EUV-IL patterns are limited to periodic structures, we have also extended the application of holographic patterning to the EUV spectral range using Computer Generated Holograms for arbitrary image synthesis. We have also recently demonstrated an extension of the Talbot Effect (discovered in 1839) to the EUV patterning. Using this self-imaging approach it is possible to pattern complex periodic patterns as those found in many modern circuits (SRAMs, DRAMs, etc.). The Generalized Talbot Imaging can be used to provide critical patterning ability without the need of complex optical systems. Finally the presentation will review the status of advanced lithography for the so-called "post-CMOS" era, discussing the challenges facing the semiconductor industry in its never ending pursuit of Moore's law next stage.

SPEAKER BIOGRAPHY

Dr. Franco Cerrina (http://www.bu.edu/ece/people/faculty/a-g/franco-cerrina/) is Professor and Chairman of Electrical and Computer Engineering, at Boston University since 2008. Previously, he was the Lynn H. Matthias Professor of Electrical and Computer Engineering at the University of Wisconsin-Madison. He is an IEEE, APS, OSA, AAAS and SPIE Fellow, recipient of the SRC Aristotle award, and has been the director of the Center for NanoTechnology (University of Wisconsin at Madison) from 1988 to 2008.

His research work is centered on semiconductor fabrication, optical patterning and advanced lithography. Multidisciplinary in nature, this activity applied to the development of novel technologies, and to their use in real-world engineering problems, including the application of microfabrication techniques to biological and genomic problems, ranging from DNA Microarrays, to DNA de-novo synthesis and to the use of DNA in nanofabrication. He has developed a novel Maskless photolithographic method for the rapid synthesis of DNA microarray chips (MAS). In addition to his academic work, he has successfully transferred several technologies to companies that he founded. The MAS is commercialized by Roche–NimbleGen Systems, a Madison (Wi) company of which he has been the first VP of Engineering. He has also been a co-founder and CEO of Genetic Assemblies, Inc., a company dedicated to the synthesis of long DNA strands (synthetic genes). In 2008 he has cofounded BioLitho, incorporated in Illinois, and in 2009 Gen9, a genomic company based in Cambridge, Massachusetts.

To arrange a meeting with the speaker, please contact Dr. Mario Marconi at (970) 491-8299 or marconi@engr.colostate.edu

ISTeC (Information Science and Technology Center) is a university-wide organization for promoting, facilitating, and enhancing CSU's research, education, and outreach activities pertaining to the design and innovative application of computer, communication, and information systems. For more information, please see ISTeC.ColoState.edu.

Both lectures are open to the public.