Modeling, Control, and Optimization: Critical 
technologies in Semiconductor Manufacturing

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2:00-3:00 pm
4-178, EECS Bldg
Monday, March 8th

ABSTRACT: We begin by reviewing the design and manufacturing flow for modern integrated circuits. We then describe the vital role played by modeling, control, and optimization technologies in this design/manufacturing flow. Next, we present our efforts in developing metrology for lithography and plasma etching applications. These include temperature, etch-rate, and thermal flux sensors. Our sensors are fully self-contained with on board power, communications, and signal processing electronics. The sensors we have developed offer very fine spatial and time resolution, making them suitable for process optimization and control. We describe our efforts in using these sensors for feedback control of the photolithography process. We then discuss our efforts at commercializing this technology. We close with an overview of our most recent work on modeling, optimization, and control for a variety of problems including inverse lithography, proximity correction, double patterning, and design rule checking.

BIOGRAPHY: Kameshwar Poolla received the Ph.D. degree from the University of Florida, Gainesville in 1984. He has served on the faculty of the University of Illinois, Urbana from 1984 to 1991. Since then, he has been with the University of California, Berkeley where he is a Professor of Mechanical Engineering and Electrical Engineering & Computer Sciences. He currently serves as the Director of the IMPACT center for Integrated Circuit manufacturing at the University of California. In 1999, Dr. Poolla co-founded OnWafer Technologies which offers metrology based yield enhancement solutions for the semiconductor industry. OnWafer was acquired by KLA-Tencor in 2007. He has also serves as a technology and mergers/acquisitions consultant for Cadence Design Systems. Dr. Poolla has been awarded a 1988 NSF Presidential Young Investigator Award, the 1993 Hugo Schuck Best Paper Prize, the 1994 Donald P. Eckman Award, the 1998 Distinguished Teaching Award of the University of California, and the 2005 and 2007 IEEE Transactions on Semiconductor Manufacturing Best Paper Prizes. Professor Poolla’s research interests include System Identification, Robust Control, Semiconductor Manufacturing, Sensor Networks, and Medical Imaging.