



Columbia University Optics and Quantum Electronics Seminar



“CMOS Technologies Based on High-Mobility Channel Materials”



Professor T.P. Ma

Yale University

Date/Time: Monday, October 1st, 11 – 12 noon

Location: Sindeband East 414/CEPSR

Abstract:

It has become increasingly difficult to scale down Si-based CMOS transistors, and high-mobility channel materials are being seriously considered as alternatives to Si for future generations of CMOS technology. Among the leading contenders are carbon nano-tube, graphene, and a few III-V semiconductors, and this talk will present an assessment of these alternatives.

The high carrier mobilities in aforementioned materials are often associated with their small effective masses, which may give rise to lower densities of states, and thus fewer carriers in the conduction channel for a given gate voltage. Therefore, a consequence of the lower density-of-state is to negate the gain in the drive current from the carrier's higher mobility. As a result, it is not obvious whether a high-mobility channel does indeed lead to high drive current. This question has been addressed for a few high-electron-mobility III-V semiconductors, and the results will be presented in this talk.

Bio: He is Raymond J. Wean Professor of Electrical Engineering at Yale University, where he has been a faculty member since 1977. He also serves as a Co-Director of Yale Center for Microelectronics, and a Co-Director of the Yale-Peking Joint Center for Microelectronics and Nanotechnology. He was Chairman of the Department of Electrical Engineering at Yale University between 1991 and 1995, and between 2001 and 2007. His research and teaching at Yale have focused on semiconductors, CMOS technology, and nanoelectronics. He is a member of the National Academy of Engineering (NAE) in USA, a foreign member of the Chinese Academy of Sciences, an Academician of the Academia Sinica in Taiwan, a Life Fellow of the Institute for Electrical and Electronic Engineering (IEEE), a Member of the Connecticut Academy of Science and Engineering (CASE), a life member of the American Physical Society, and a member of the ECS, MRS, Sigma Xi, and Yale Science and Engineering Association (YSEA).

Hosted by Prof. I.Kymissis • For further information: call 212 854 4023