IMEP-LAHC

SEMINAIRE EXCEPTIONNEL

(de 10h à 11h, amphithéâtre, Bât. INP, MINATEC,
ouvert aux chercheurs des autres laboratoires)

Mardi 2 novembre 2010

"Resistive RAM, Nanowire TFET, Surface Plasmon Polariton: the Shifting Scenario in Computational Nanoelectronics"

by Prof. Zhiping YU,
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Abstract: To sustain the steady improvement in speed, scale, and saving of power for silicon-based ICs while the end of ITRS roadmap looms, new materials, structures, and devices (MSD) are urgently needed. This talk covers three alternative structures to complement planar CMOS technology from numerical simulation point of view:

1. Resistive RAM (RRAM) made of carbon and TiO for non-volatile memories;
2. Nanowire tunneling FETs (NW-tFETs) with SiGe heterojunction for low-power, high-performance logic devices;
3. Surface plasmon polariton (SPP) waveguide for propagation of THz signals on silicon chips.

Different levels of physics complexity are incorporated in the simulation, from macroscopic drift-diffusion carrier transport including tunneling and EM solver, to molecular dynamics (MD) and quantum transport at atomistic level. The simulation of SPP also involves interplay with optics.

To address the need for study of novel nanoelectronic devices such as graphene narrow-ribbon (GNR) transistors, an EHT (extended Hücker theory) plus NEGF (non-equilibrium Green's function) code has been developed to efficiently calculate the band structure and evaluate *I-V* characteristics. Overall, these nanotechnology CAD activities in Tsinghua will be described.

***Prof. Zhiping Yu**, an IEEE Fellow, is the Novellus Professor of Microelectronics at the Institute of Microelectronics in Tsinghua University, Beijing, China. He is currently also a Visiting Professor in EE Dept. at Stanford University, CA, USA. He graduated from Tsinghua University with Bachelor degree in 1967 (Dept. of Radio Electronics), and MS (1980) and Ph.D. degree (1985) from EE Dept. in Stanford University. His main research interests include IC CAD, physics for nanoelectronic devices, numerical simulation at atomistic level, and modeling and design of CMOS RF circuits. He has published more than 300 technical papers and is the co-author of two books: one with Prof. R.W. Dutton of Stanford on TCAD by Kluwer (1993) and one on CMOS RF circuits (in Chinese) by Tsinghua University Press (2006). He is currently member of the Nanotechnology Committee, Electron Device Society, IEEE, and has served as the Associate Editor of IEEE Trans. CAD of IC & Systems from 1996 to 2005.*

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