



SEMINAIRE

de 13 h à 14 h, salle Belledonne, IMEP-LaHC, Bât. BCAi, Minatec,
ouvert à tous : enseignants, étudiants, chercheurs, administratifs, techniciens)

Jeudi 17 novembre 2016

“Functional Nanowire Field-Effect Transistors for Optoelectronic and Bioelectronic Applications”

by Ming-Pei LU

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Abstract: Nanowire (NW) semiconductors possessing high aspect ratios and significant surface effects have been proposed to serve as basic building blocks in nanoscale photosensors/ phototransistors and biosensors for next-generation multifunctional chips. In this presentation, we will introduce our research work regarding ZnO NW field-effect transistors (FETs) for phototransistor and optoelectronic memory applications firstly. The use of low-frequency current noise spectroscopy to explore the physical mechanism behind the current noise in ZnO NW photoFETs under dark and UV illumination conditions was demonstrated. Moreover, we also observed that an ultrahigh photoconductive gain ($\sim 10^{10}$) in ZnO NW photoFETs featuring strong persistent photoconductivity enabled a memory capacity for writing multibit optical data into an NW for FET for nanoscale optoelectronic memory application. In the second part, we will present our achievements regarding CMOS-compatible Si NW bioFETs for bioelectronic applications. We found that NW bioFETs with highest sensitivity were obtained when we operated the device in the subthreshold regime while applying an appropriate value of gate voltage. In the bioFET systems, the interactions between the mobile charged polymers and the immobilized molecules on the NW surface, and the effect of charge neutrality on the NW conductance were highlighted as well.

Dr. Ming-Pei Lu received his Ph.D. in Electronics Engineering from National Chiao-Tung University in Taiwan in 2006. In January 2007, he joined the National Nano Device Laboratories in Taiwan as an Associate Researcher. He is interested in functional nanomaterials for potential applications in the fields of nanoelectronics, optoelectronics and nanosensors.

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