The 88th MANA Special Seminar





Carbon nanotubes as ultrasensitive detectors of electron transfer processes Chair: Dr. Samuel Sanchez (ICYS-MANA Researcher)

Prof. Maria Jose Esplandiu

It is more than well-known the unique properties of carbon nanotubes and how they have been exploited to reveal fundamental physical phenomena and to design novel nanodevices for a wide range

of applications (sensors, nanoelectromechanics, energy conversion/storage, mechanical reinforcement, etc.). For instance, the prominent electrochemical properties of carbon nanotubes (given especially by their structure and nanometric size) have impelled the design of diverse electrode configurations. That combined with their chemical properties and (bio)functionalization versatility have made these materials very appropriate for the development of electrochemical biosensors. On the other hand, the semiconductor character of the nanotubes has been exploited for applications mainly in nanoelectronics and sensor technology by using a field effect transistor configuration with the nanotube acting as the conductive channel. These types of devices turn out to be highly promising for biomolecule sensing (enzymes, proteins, ADN, etc.) and for the monitoring of biological processes. Based on these precedents, the goal of this work is to determine the ultimate sensitivity of carbon nanotubes for electron transfer processes with species adsorbed on their surface in such field-effect transistor configuration. Specifically, we will analyze electron transfer processes between metallic and semiconductor nanoparticles immobilized on the carbon nanotubes Such devices allow us to detect not only single electron events between nanotube and the nanoparticles but also determine the nanoparticle energy level distribution and the band-gap in the case of the semiconductor nanoparticles.

Venue: Seminar Room #431, MANA Bldg. Date: July 2nd Thursday Time: <u>15:30-16:15</u>



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