

**Dottorato di Ricerca in Fisica dell'Università degli Studi di Messina**  
1 Dicembre 2011, ore 15.00, Sala Seminari IPCF-CNR  
V.le F. Stagno d'Alcontres 37, S. Agata, Messina

Seminar title:

**A novel hybrid top-down/bottom-up approach for nanoparticle synthesis:  
Laser ablation in reversed micellar solution**

**Dr. Pietro Calandra**  
*IPCF-CNR Sede di Messina*

If the building up of smaller and smaller structures promptly answers the recent technological request of more and more miniaturized devices, it is also true that new and exotic features arise below a certain size threshold of particles basically due to quantum confinement of charge carriers (Quantum Size effects). In addition to size effects, further peculiar properties are expected to arise by controlling the spatial location of different materials, e.g. semiconductor and metal domains, within each nanoparticle [1]. In fact, it is well known that semiconductor/metal junctions give rise to very interesting phenomena which have been exploited in a wide range of technological applications (transistors, rectifier junctions, Ohmic contacts as well as effective photocatalysts).

In order to prepare A@B-type materials (A and B referring to two different materials), we set up a novel synthetic method based on the laser ablation of a target of the material A, immersed in a reversed micellar solution containing nanoparticles of the material B. This strategy is a winning example of an hybrid approach combining, in a synergistic way, the advantages of a top-down approach (high purity of the ablated particles [2]) and a bottom-up one (synthesis of B and self-assembly of A onto it).

[1] T. Hirakawa and P. V. Kamat, *J. Am. Chem. Soc.* **127**, 3928 (2005).

[2] P. Calandra *et al.*, *Materials Letters* **64**, 576 (2010).