



# Appunti di Fisica '17 & Dottorato di Ricerca in Fisica

**3 maggio ore 15:00  
Sala seminari, CNR-IPCFCN**

## **Silicon Nanowires: the route from synthesis towards applications**

**Maria Josè Lo Faro**

(CNR-Istituto per i Processi Chimico-Fisici)

Silicon nanowires (NWs) are attracting the interest of the scientific community as building blocks for a wide range of future nanoscaled devices. We demonstrate the synthesis of NWs by a cheap, fast and maskless approach compatible with Si technology, using metal-assisted chemical etching of Si substrates catalyzed by thin metallic layer. This is a powerful technique to obtain high density and low-cost Si NWs with high and controllable aspect ratio.

NWs obtained by this method have tunable nanometer-size diameter, suitable to observe quantum confinement effects, indeed a bright room temperature PL in the visible range is reported. Moreover Si NWs maintain the same crystalline structure and doping of the starting substrate, a fundamental feature for devices implementation. The realization of Si NWs-based light emitting devices has been demonstrated, showing an efficient room temperature electroluminescence emission at low voltage. We fabricated a low-cost multiwavelength light source working at room temperature, achieved combining Si NWs and carbon nanotubes (CNT). The NW/CNT hybrid system exhibits a tunable emission both in the visible range, due to Si NWs, and in the IR from CNT, and the conditions leading to the prevalence of the visible or the IR signal have been identified opening the route towards silicon photonics.

Furthermore we combined the high aspect ratio of NWs with plasmonic effects, investigating the structural and optical properties of Si NWs decorated with metallic clusters for sensing applications.

<http://sites.google.com/site/AppuntiDiFisicaMessina/>