

# Materials and Technologies for High Efficiency Solar Cells: from standards to nanostructures

*Introduce:*

**Prof. Luca GAVIOLI**

Università Cattolica del Sacro Cuore

*Interviene:*

**Prof. Antonio TERRASI**

Dipartimento di Fisica e Astronomia, Università degli Studi di Catania

**Abstract:**

Photovoltaics is certainly the main technology for both large and small scale production of renewable energy. From less than 1W (pocket calculators, watches, lamps) to megawatts (PV solar fields), solar cells are the most employed devices to get electrical energy in a silent and sustainable way. PV technology is very well know and robust since several decades but still it represents only a small part of the total energy production. The dependence on the weather conditions, on the day/night cycle, the high costs of materials and processes, the need of large land areas are factors limiting the PV technology with respect to conventional (carbon, gas and oil) energy sources. A drastic change can be obtained only with an increasing of the conversion efficiency, the use of abundant and not expensive materials, the improvement of the fabrication processes. This is why a very simple technology as the solar cell's one attracts so much interest and research efforts. The lecture will start with a general overview of the renewable and sustainable energy topic, stressing the concept of critical materials for different kind of applications. The presentation will then focus on the PV effect and solar cells, describing the basic mechanisms and limitations of this technology, from materials to fabrication processes and cell architectures. Finally, the most advanced ideas for the next generation solar cells, based also on quantum physics and nanostructures, will be presented and discussed.

## Seminario

**Martedì 13 febbraio 2018**

**Sala Riunioni, ore 10.30-12.30 e 15.00-17.00**

Via dei Musei 41 - Brescia

International Doctoral Program in  
Science@Università Cattolica del Sacro Cuore  
Corso di Dottorato in Ingegneria Meccanica e  
Industriale@Università degli Studi di Brescia

**I-LAMP**  
Interdisciplinary Laboratories  
for Advanced Materials Physics



**UNIVERSITÀ  
CATTOLICA**  
del Sacro Cuore