Nano-plasmonic devices: an introduction

Course at a Glance
Theoretical fundamentals on plasmonics; electromagnetic field on metallic nano-structures; applications.

Instructors
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Credits: 3

Synopsis
Plasmonics is a branch of Physics extremely promising for its applications in electronics, chemistry, computer science, solar energy harvesting and biology. In particular, it is dedicated to the investigation of confined electromagnetic waves originating by the combination of free electrons with the light source. Besides noble metals, artificial materials are at the base of Plasmonics. This aspect strictly relates it to Nanotechnology, a growing science aiming to investigate both the theoretical and fabrication aspects of devices with dimensions in the nanometer range.

In the present course will focus on a general introduction to plasmonics providing also the physical [1] and mathematical tools to predict the electromagnetic behaviour of plasmonic nano-devices. Among the many examples where plasmonics and nanotechnology are combined, we shall introduce devices for light concentration [2], biological analysis [3] and light harvesting [4].

Syllabus
The course develops in about 9/10 hours in the classroom.
- Fundamental concepts underneath plasmonics
- Surface plasmon polaritons vs. localized plasmons
- Key advantages of plasmonics
- Plasmonics and its applications

The examination consists in a journal club or a brief research project proposal.

Reading list
[1] Alessandro Alabastri, Salvatore Tuccio, Andrea Giugni, Andrea Toma, Carlo Liberale, Gobind Das, Francesco De Angelis, Enzo Di Fabrizio and Remo Proietti Zaccaria,
[2] Remo Proietti Zaccaria, Alessandro Alabastri, Francesco De Angelis, Gobind Das, Carlo Liberale, Andrea Toma, Andrea Giugni, Luca Razzari, Mario Malerba, Hong Bo Sun, and Enzo Di Fabrizio,

**Venue**
IIT - Via Morego 30, 16163 Genova

**Course date**
October - November 2015