

INSD NanoScience Video Lectures (No.1 & 2)

Title: "Why graphene warrants a Nobel prize?"

Lecturer: Prof. Francesco Mauri

(Universite Pierre et Marie Curie – Universite Paris VI)

Date and Time: November 30th and December 2nd, 16:30-18:30

Video Room: Graduate School of Engineering Science, Building G, Room G217

Maximum Capacity of Audience: 30

The video lectures are transmitted from Paris as a part of Nanomat Master Program.*

Abstract:

In 2004 Andre Geim, Konstantin Novoselov, showed that it is possible to produce by exfoliation of graphite, to identify and to manipulate a graphene flake, one-atom-thick 2 dimensional membrane. In addition, they were able to measure the electron transport properties of such a system in a field effect transistor (FET).

In these lectures I will present the peculiar mechanical, electronic, optical properties of graphene. I will illustrate the available production techniques. Finally I will discuss potential applications of graphene in electronics and in flat screen technology.

Interestingly, from their very first works, Andre Geim, Konstantin Novoselov showed us that it is possible to produce, beside graphene, other one-atom-thick membranes starting from bulk layer materials (e.g. dichalcogenides). Graphene inherits its peculiar electronic properties from the semimetal character of the graphite band structure. The exfoliation into atomic monolayers of compounds, that in their bulk form are superconductors and/or present charge and spin density wave, opens the possibility of obtaining new two dimensional materials with exotic electronic properties. I will argue that one of the most interesting outcome of graphene research is the possibility of using a field effect transistor to control, in a very effective way, the doping charges and thus the electronic properties of such exotic one-atom-thick membranes.

* See details at the following website for Nanomat Master (International master in materials and nano-sciences) : http://www.nanomat-master.eu/presentation/presentation_en.htm

Reference: Prof. T. Itoh, Institute for NanoScience Design, E-mail: itoh@insd.osaka-u.ac.jp