
HYDROGEN ON AND IN DIAMOND

(Enhanced electron emission and the formation of a new donor state)

Speaker: Prof Rafi Kalish
Professor of Physics, J. Arbuse Chair of Electronics
Physics Dept. and Solid State Institute,
Technion- Israel Institute of Technology- Haifa Israel

Venue: Blk S13, Level M, Room 11, Physics Conference Room,
Physics Department, Faculty of Science, NUS

Date: 18th June 2007 (Monday)

Time: 3.00pm – 4.00pm

Abstract:

Diamond is a technologically most promising semiconductor with unique properties. When the diamond surface is hydrogen terminated it induces a surface dipole that renders the surface to exhibit a negative electron affinity. Hence electron emission from diamond is much enhanced over that of other materials. Furthermore, when the H terminated diamond surface is exposed to H₂O, to C⁶⁰ and to some organic materials a two-dimensional p-type surface conduction sets in. In the first part of the talk the physics behind these phenomena and how these are exploited in the realization of electronic devices in diamond on the nano scale will be described. In the second part (time permitting), recent results on the conversion from p- to n-type conduction that occurs when hydrogen is introduced into B doped (p-type diamond) will be presented.

Profile:

Education: Ph.D. Weizmann Institute, Rehovot, 1966

Major Appointments: Technion, Haifa, Israel, Senior Lecturer, 1969-71
Associate Professor 1971-77
Professor, 1978-present

Visiting (Long-term) Appointments: IBM Yorktown Heights, 1982-83
Dept of Electrical Engineering, UCSB., 1990-91

Awards and Prizes: Joan Arbuse Chair in Electronics, 1988-present
Ben-Gurion University Applied Science Award, 1990
Lyle Fellowship, University of Melbourne, 1993
Miegunyah Distinguished Visiting Fellow, Uni of Melbourne, 1996

Research Interests:

- *Ion-implantation and damage annealing of semiconductors: structural and electrical effects.
- *Ion-implantation doping of diamond, nano diamond and CVD diamond films.
- *n-type doping of diamond
- *Electrical characterization of damaged and doped diamond.
- * Hydrogen **in** and **on** diamond
- *Growth and Electron emission (Field emission., ion and electron-induced emission) from carbons (diamond, nano diamond, a-C and nano-tubes)
- * Growth of Diamond by CVD (hot filament and microwave)
- * Growth of amorphous C (t-aC, DLC)
- * Ion-implantation doping and annealing of compound semiconductors.
- *Various ion beam analysis techniques (RBS, PIXE, nuclear reaction analysis).

For details, please contact:

Mr Leong Wai Kit, NUSNNI, Blk S13, #02-12A, 2 Science Drive 3, Singapore 117542

Tel: 6516-3980, Fax: 6779-0350, Email: nnilwk@nus.edu.sg