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## **Adsorption of metal phthalocyanine on germanium surfaces**

**Speaker: Professor Ignatius Thomas McGovern**  
**School of Physics, Trinity College, Dublin, Ireland**

**Venue: Blk S13, #M01-11, Physics Conference Room,**  
**Department of Physics**  
**Faculty of Science, NUS**

**Date: 19 May 2009 (Tuesday)**  
**Time: 3.00 – 4.00pm**

**Abstract:**

The monolayer adsorption of metal phthalocyanine (MPc) molecules on germanium surfaces is investigated by scanning tunneling microscopy (STM) and the synchrotron-based techniques of near edge X-ray absorption fine structure (NEXAFS) and soft X-ray photoelectron spectroscopy (SXPS). The MPc molecules include both planar and non-planar structures while the surfaces include (001)-2x1, (001)-H-2x1 and (111)-c2x8. Topics for discussion include: a preferred adsorption site for MPc on Ge(001)-2x1 and the formation of small ordered chains; the up/down adsorption options of non-planar MPc on this surface; the relative strength of interaction of MPc with the three surface types; the potential contributions to the apparent tilt of MPc with respect to the surface, as judged by NEXAFS; and how preliminary calculations by density function techniques are informing these studies.

For details, please contact:

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**About speaker:**

**Ignatius Thomas McGovern**

**Title:** Associate Professor

**Institution:** School of Physics  
Trinity College Dublin

**Date of Birth:** 30<sup>th</sup> September, 1948

**Place of Birth:** Coleraine



**Degrees:**

BSc (hons) in Physics (Belf) 1970

PhD in Physics (Belf) 1977

**Academic career:**

Research Fellow, New University of Ulster 1974-77

Postdoctoral Research Fellow, University of Pennsylvania 1977-78

Postdoctoral Research Fellow, University of Wisconsin 1978-79

Appointed Lecturer in Physics (TCD) 1979

Director of Science of Materials 1994-8

Associate Professor of Physics since 1996

Director of Graduate Studies, Department of Physics 2003-5

Director of Teaching & Learning (Undergraduate) School of Physics 2007-9

**Research accomplishments:**

My area of research is Surface Physics, specifically the photoelectron spectroscopy of semiconductor surfaces and interfaces using synchrotron radiation (SR). I have made a sustained contribution to this developing field over the past 30 years, including:

- Development of the first SR photoelectron spectroscopy facility for surface science in these islands (at the NINA synchrotron UK)
- First demonstration of equivalence of “fixed angle, variable photon energy” and traditional “fixed photon energy, variable angle” approach to bandstructure determination in photoelectron spectroscopy
- First measurement of bandstructure of an intercalation compound
- Contributions to the understanding of metal-semiconductor interface formation

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- Comprehensive model of the adsorption of hydrogen sulphide on (110) indium phosphide, based on data from three SR techniques
- Contributions to the development of novel photoelectron diffraction and x-ray standing wave techniques
- First observation of “up/down” effects in the SR photoelectron spectroscopy of non-planar metal-phthalocyanine molecules adsorbed on germanium surfaces
- Establishment (at Trinity College) of a suite of surface science chambers with facilities for x-ray photoelectron spectroscopy and allied surface preparation and analysis techniques.
- Supervision of 12 higher degree theses
- Publication of 90+ papers and reviews on surface science

**Current research interests:**

In recent years my research has focused on organic molecule adsorption; I combine the now established SR spectroscopies with scanning probe techniques. Current projects are concerned with organic-inorganic interface formation and the self-organisation of porphyrin-based nanomeshes. A further project is concerned with high-k dielectric films as gate oxides on III-V semiconductors

**Current research grants:**

2008-11	Porphyrin-based nanomeshes as a novel route to molecular electronics (SFI RF) co-PI
2006-9	The fabrication and characterisation of high-k dielectric/InP based devices (SFI RF) co-PI
2004-8	Synchrotron radiation X-ray spectroscopic investigations of electronic structure in organic semiconductors (SFI Basic) co-PI

**Recently completed grants:**

2002-6	Organic semiconductor nanostructures (HEA) PI
1998-2	Structure of organic/inorganic semiconductor interfaces (EI) PI

**Contribution to subject:**

I have been active in promoting my subject at national and international levels, as Chairperson of the Institute of Physics in Ireland, Chairperson of The Thin Films & Surfaces Group of The Institute of Physics and through numerous European Review Panels. I have been External Examiner in a number of Universities and Institutes of Technology.

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**Awards & Honorary Appointments:**

Alexander von Humboldt Fellow, Fritz-Haber-Institut 1986  
Fellowship of Trinity College 1990  
Chairperson, Thin Films & Surfaces Group IOP 1990  
Visiting Fellow, Magdalen College Oxford 1998  
Chairperson, Institute of Physics in Ireland 2001  
Fellowship of Institute of Physics 2003  
Distinguished Visiting Fellow, La Trobe University 2006

**Host by: Professor Andrew Wee**