

T_cSAM Special Seminar

Texas Center for Superconductivity and Advanced Materials

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“Analysis of Surface Nano-structures by XPS”

Thursday, November 11, 2004

Room 102, University of Houston Science Center

12:00 noon – 1:00 p.m.

Abstract

The accuracy and capability of NPS for analysis of surface nano-structures has improved significantly in the past decade. This was achieved by modeling the change in energy distribution with the path the XPS electrons travel to reach the surface. When this is compared to measured energy spectra, the depth distribution of atoms can readily be determined. The method, which is now widely used, provides analysis with sub nano-meter depth resolution in the 0 - ~10 nm depth range. We discuss the underlying physics as well as the prospects of a newly proposed model for automatic data analysis intended for XPS imaging. We will also discuss several practical applications of the technique as for example to thin metal-oxide films, SiO-nitrides, low energy ion implants in SiO₂, surface segregation phenomena in PS-PDMS diblock copolymers, etc.

Bio

Prof. Sven Tougaard received the degree in Civil engineering from Technical University of Denmark in 1975, a Ph.D. from Odense University in 1979, and the Dr. scient. from Odense University in 1988. He was a Research fellow (1975-78) and Senior fellow (1978-81) at Odense University; Postdoctoral fellow at the University of Houston (1979-1982); an Adjunkt (1981-82), and Research Council fellow (1982-84) at Odense University; a Postdoctoral fellow at Universität Osnabrück, Tyskland (1984-85). He became a Lektor at Odense University in 1984.

Prof. Tougaard's research interests include new improved methods for chemical analysis of surface nano-structures by x-ray photoelectron - and Auger electron - spectroscopy (XPS og AES), as well as theoretical models for inelastic scattering of 100 eV to 10 keV electrons at and near solid surfaces. The models are based on a dielectric response description of the electron-solid interaction. The results are applied to describe the change in energy distribution of electrons during transport in the surface region of solids. The models are also applied to determine the complex dielectric function of solids in a wide energy range (e.g. up to 200 eV) by applications in analysis of reflected electron energy loss (REELS) experiments.

His research projects also include studies of the nano-structure of thin germanium films on silicon; elastic electron scattering in solids, analytical methods and Monte Carlo simulations, and the importance for electron transport at solid surfaces. In addition, he developed QUASES Software for analysis of the nano-structure of solid surfaces from XPS and AES data..

Prof. Tougaard is an advisory editorial board member for 'Surface and Interface Analysis' (1990-); associate editor for 'Surface Science Spectra' (1991-); editorial board member for 'Journal of Electron Spectroscopy and Related Phenomena' (1991-); and International Advisory Committee member for 'Journal of Surface Analysis' (1995-). He is a member of the ISO TC/201 committee on ISO Standards for Surface Analysis, and the Surface Chemical Analysis Section of Versailles Project on Advanced Materials and Standards.

Persons with disabilities who require special accommodations in attending this lecture should call (713) 743-8210 as soon as possible.

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