

EINLADUNG

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VORTRAG

von

Prof. Dr. Marc DOWSETT
University of Warwick, England

Prof. Dr. Annemie Adriaens
University of Ghent, Belgium

New instruments, techniques and studies in the chemical evolution of heritage metal surfaces

Donnerstag, 11. Oktober 2012, 16:00 Uhr

Akademie der bildenden Künste, Schillerplatz 3

Vortragssaal EA1 (Erdgeschoss)

Prof. Dr. Mark Dowsett - holds a full professorship in the Physics Department of the University of Warwick and is a Visiting Professor in Materials at Imperial College of Science and Technology, London. He is leader of the Analytical Science Projects group <http://www2.warwick.ac.uk/fac/sci/physics/research/condensedmatt/SIMS/>. For over 30 years his main interest has been the invention and application of novel scientific instruments. From 1970 onwards his focus was on secondary ion mass spectrometry (SIMS) and he designed and built several SIMS instruments with novel control systems and ion optical features. Most of these innovations have now found their way into commercial tools such as the Cameca 4550 which features his ultra low energy primary ion column (the FLIG) and matching secondary ion optics. This instrument is widely used by companies such as Intel, and plays a role in the development of electronic materials for ICT. Recent innovations in SIMS include its use below 100 eV for the analysis of the top few nm of a sample, and the use of lasers to make insulating surfaces such as metal oxides conductive so that they can be more easily analysed.

During the last 8 years he has become fascinated by synchrotron x-ray methods – principally because of their ability to reveal chemistry and structure in evolving systems in a native environment such as a gas-filled or electrochemical cell. Working with Professor Annemie Adriaens from Ghent University he has designed and applied a range of electrochemical/environmental cells for use in synchrotron beam-lines, exploring their use through application to problems of corrosion and conservation in heritage metals. This work currently involves two main themes: (i) the design of portable environmental cells with the objective of maintaining sample environments for the months with elapse between synchrotron beam time allocations so that long term changes in surfaces can be studied, and (ii) the development of a new analytical tool, the x-ray excited optical microscope (XEOM). The driving force behind this work is the need for *in-situ* and non-invasive analytical methods to improve our capability for examining the effectiveness of new protective treatments for heritage metals, and obtaining an in-depth understanding of conservation techniques.

In parallel with this activity he writes data processing and modelling software whose main vehicle is the code esaProject. This is a modern user-friendly program for processing images spectroscopic data and diffraction patterns from a wide range of techniques and allowing it to be presented in a comparative way. For example, it processes surface powder diffraction images, dealing with highly elliptical projection of diffraction cones onto the camera face (outside the scope of other currently available software), and is capable of a large range of operations on image stacks. It contains a rapidly expanding set of tools for extracting and processing spectra and diffraction data, and presenting the results without the need for other packages.

Prof. Dr. Annemie Adriaens

Annemie (Mieke) Adriaens graduated with a PhD in Analytical Chemistry in 1993 from the University of Antwerp (Belgium), where she was involved in the optimization of new technologies for inorganic micro and trace analysis.

In 2001 she became professor in Analytical Chemistry at Ghent University (Belgium) where she leads the research group “Electrochemistry and Surface Analysis”. Research involves, amongst other projects, the use of electrochemical techniques for monitoring and treatment of corroded metallic objects. The experiments are performed using spectroelectrochemistry, allowing the simultaneous treatment/monitoring and analysis of the metal surface.

She was chair of COST Action G8 “Non-destructive Analysis and Testing of Museum Objects” (2001-2006) and vice-chair of COST Action D42 “Chemical Interactions between Cultural Artefacts and Indoor Environment” (2006-2010). She is vice-chair of the European Federation of Corrosion Working Party 21: “Corrosion of Archaeological and Historical Artifacts”.

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