Slovak Physical Society

SLOVAK UNIVERSITY OF TECHNOLOGY IN BRATISLAVA
Faculty of Material Sciences and Technology
Institute of Materials Science

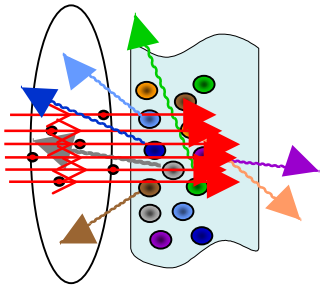
Forschungszentrum Rossendorf

Invites you to attend

Lecture Series on

Ion Beam Research in Materials Science

May, 26 – 30, 2008



Prof. Dr. rer. nat. habil. Dr. h. c. mult.
Klaus Wetzig
IFW Dresden, Germany
Guest Lecturer

Prof. Klaus Wetzig is professor of materials analysis at Dresden University of Technology. He is author and co-author of more than 280 research articles and editor of the monographs “In Situ Scanning Electron Microscopy in Materials Research” (1995) and “Metal Based Thin Films for Electronics” (2004). His research interests include materials analysis and microstructures, especially electron microscopy of functional materials, characterization of thin films for electronics and nanostructural features in general.

Where: Institute of Materials Science, J. Bottu 23, Trnava
Faculty of Materials Science and Technology
Slovak University of Technology in Bratislava

Program

	9:00 - 10:30	10:30 - 11:00	11:00 - 12:00	12:00 - 14:00	14:00 - 15:00
26.05.2008	Lecture	Coffee break	Lecture	Lunch	Lecture
27.05.2008	Lecture	Coffee break	Lecture	Lunch	Lecture
28.05.2008	Lecture	Coffee break	Lecture	Lunch	Lecture
29.05.2008	Lecture	Coffee break	Lecture	Lunch	Lecture
30.05.2008	Lecture	Coffee break	Lecture	Lunch	

Outline

Part I Fundamentals

I.1 Physics of the Ion
I.2 Ion Sources
I.3 Ion – Solid State Interactions
I.4 Properties of emitted Particles

Part II Ion Beam Technology

II.1 Ion Sources Set-up
II.2 Ion Accelerator Systems
II.3 Ion Spectrometers
II.4 Ion Detectors

Part III Materials Preparation with Bombarding Ions

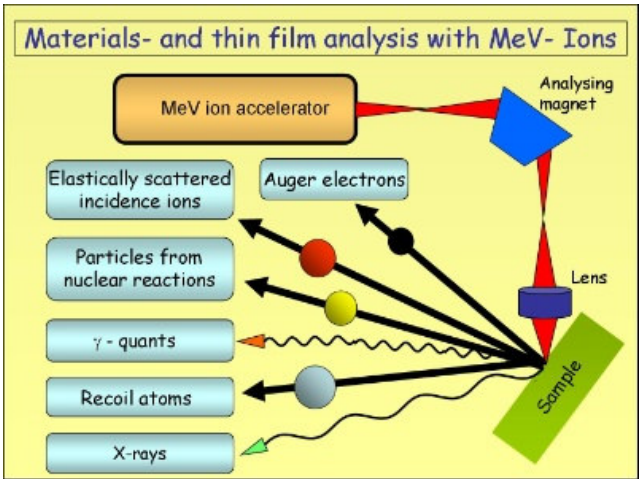
III.1 Ion Beam bombarding Techniques
III.2 Ion bombarded Materials Surfaces

Part IV Ion Beam Materials Analysis

IV.1 Introduction
IV.2 RBS and ERDA
IV.3 PIXE and NRA
IV.4 SIMS
IV.5 Ion Imaging Techniques

Part V Selected Materials Applications

V.1 Surface and Layer Formation / Modification
V.2 Ion Beam Analysis in Art and Archaeology
V.3 Special Applications in Life Science
V.4 FZD: Center for Application of Ion Beams in Materials Research (AIM)



Modern technology depends on materials with precisely controlled properties. **Ion beams** are a favoured method to achieve controlled modification of surface and near-surface regions. In every integrated circuit production line, for example, there are ion implantation systems. In addition to integrated circuit technology, ion beams are used to modify the mechanical, tribological and chemical properties of metal, intermetallic and ceramic materials without altering their bulk properties. Ion–solid interactions are the foundation that underlies the broad application of ion beams to the modification of materials.

Typical fields of utilisation of ion beam technology are as follows:

- Exposed parts in automotive and mechanical engineering industry (injection nozzles, camshafts, bearings, valves and others);
- Medical and biomedical applications (prosthetics with interesting alloys, even those with the surfaces not sufficiently wear-resistant);
- Surface nitration of stainless steels via ion implantation with the purpose to improve wear resistance of stainless steels while preserving their high corrosion resistance;
- Stents (endoluminal catheter protheses), nano-porous stents for additional controlled administration of drugs, biocompatible and blood-compatible materials, etc. for modern medicine;
- Further possibilities of ion implantation in industry in the fields other than microelectronics, such as precise mechanics, special construction parts of expensive watches;
- High thermal oxidation protection (Ti, Al – alloys, turbine construction);
- Mould injection of plastics (improvement of safety in the removing of injection-made plastic parts from the mould, as well as wear protection of highly exposed parts of forming tools);
- Ion implantation of polymers surfaces for the improvement of certain surface properties, such as printability for electric conductivity, biocompatibility, etc.

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