MARK YOUR CALENDARS

Opportunities '06

2006 AVS Short Courses*

May 22-26, 2006

David Adams, Chair

dpadams@sandia.gov

*Student Scholarships available

May 22 - 26, 2006
Embassy Suites
Albuquerque, New Mexico

Technical Sessions

Student Paper & Poster Competition

Technologist Poster Competition

May 22 - 23, 2006

Julia Fulghum, Chair

jfulghum@unm.edu

Vendor Show

May 23, 2006

Guild Copeland, Chair

gcopel@sandia.gov

For more information about the Opportunities '06 and the Chapter visit www-chne.unm.edu/avs/avsinformation.htm

Answers to FAQ's

Short Course List
Short Course Descriptions
Short Course Registration Form
Vendor Show Information

Short Course • General Information

Registration Information: Registration will be on a first received basis upon receipt of the registration form and payment of course fees. Class sizes will be limited and early registration is recommended. All registrations will receive an acknowledgement. After **May 1, 2006** please fax registration forms to 505 277.5433 or 505 255.8658 or email information to cbrozena@unm.edu or brozena@flash.net

Cancellation Policy: All courses are subject to cancellation if a sufficient number of registrations have not been received by **May 1, 2006**. Please register early to avoid cancellation of courses.

Course Location and Meeting Times: All courses meet from 8:30 AM until 4:30 PM at the Embassy Suites Hotel Albuquerque, 1000 Woodward Place NE, Albuquerque, NM. Take I-25N to Lomas Blvd, Exit 225. Turn left onto Lomas. Go 2 blocks and turn right onto Woodward Place. The hotel is located on north side of Lomas.

Lunch/Breaks: Refreshments and a full lunch will be provided at the Embassy Suites Hotel for each day of the course. There will be short breaks in the morning and afternoon. Lunch will be held from 12:00 noon to 1:00 PM each day. Refreshments and lunch are included in the course fees.

Refunds: Refunds will be made only if a written request for withdrawal is received on or before **May 1, 2006.**

Scholarship Program: A limited number of scholarships are available for full time college students wishing to attend a short course. Please check the scholarship box on the registration form. For additional information on scholarships, contact Cheryl Brozena, 505 277.2225 or 505 255.8658. Application deadline is **May 1, 2006.**

For additional information, please contact AVS/NMC
Short Course Committee Chair, David Adams
505 844.8317 or dpadams@sandia.gov
or
Cheryl Brozena, 505 277.2225 or 505 255.8658
cbrozena@unm.edu or brozena@flash.net

New Mexico Chapter AVS Short Course Program

May 22-26, 2006

Basic Vacuum Technology
5-day course • 5/22 – 5/26/06 • $1,495.00

An Introduction to Ion Sources: Principles and Techniques
1-day course • 5/22/06 • $575.00

Vacuum Vessel Engineering
1-day course • 5/22/06 • $575.00

Plasma-Enhanced CVD: Fundamentals, Techniques and Applications
1-day course • 5/22/06 • $575.00

Thin and Ultra-thin Film Analysis, Characterization, and Metrology for the Wafer Processing Industry
1-day course • 5/22/06 • $575.00

Plasma Etching and RIE: Fundamentals and Applications
2-day course • 5/23- 24/06 • $850.00

Operation and Maintenance of Vacuum Pumping Systems
2-day course • 5/23 - 24/06 • $950.00

Thin-Film Deposition by Evaporation
1-day course • 5/23/06 • $575.00

Focused Ion Beams: Principles and Applications
1-day course • 5/23/06 • $575.00

Basics of Radio Frequency Technology
2-day course • 5/24 - 25/06 • $850.00

Data Processing in XPS/ESCA and AES
1-day course • 5/24/06 • $575.00

Atomic Layer Deposition
1-day course • 5/25/06 • $575.00

Vacuum Leak Detection
1-day course • 5/25/06 • $575.00

Depth Profiling
1-day course • 5/25/06 • $575.00

Basic Vacuum Technology

5-day course: 5/22 – 5/26/06 Cost: $1,495.00 - 5 Day Fundamentals Course

Course Objectives

- Understand vacuum fundamentals essential to operating, maintaining, designing, or using vacuum systems.
- Know the working principles and limitations of pumps, gauges, and other vacuum system components.
- Understand the procedures for operating and performing preventive maintenance on vacuum systems, including analyzing and troubleshooting malfunctioning vacuum systems and leak detection.
- Learn the design concepts involved in matching equipment and instrumentation to applications.

Course Description

This extensive five-day course provides a working knowledge of vacuum equipment and the technology associated with its use. It includes enough theory to provide a basis for the material covered; however, the major emphasis is on practical applications.

The working principles of the pumps and gauges used on vacuum systems are discussed, followed by a description of the characteristics of pumps and gauges in current use. Characteristics required of components such as valves, connecting lines, flanges, and seals that connect pumps to process chambers are described next, especially with regard to the application (i.e., medium-, high-, or ultrahigh vacuum conditions). The materials normally used for vacuum systems are discussed, especially with regard to handling, fabrication, and cleaning procedures.

Procedures for system operation, preventive maintenance, and leak detection are covered with emphasis on practical applications. In addition, techniques used to troubleshoot systems operating at less than optimum levels are provided. System design concepts for matching equipment and instrumentation to the intended application are also covered.

Who Should Attend?

Those entering the field of vacuum technology or fields using vacuum technology who need a detailed working knowledge of vacuum equipment and practice will benefit from this comprehensive introduction. Those interested in a review of vacuum basics will also find this course valuable.

Instructors:

Woody Weed, Sandia National Laboratories; Mike Benapfl, Lawrence Livermore Laboratories; Bill Boedeker, retired Los Alamos National Laboratory; Chuck Walker, Sandia National Laboratories; David Adams, Sandia National Laboratories

Course Materials: "A User's Guide to Vacuum Technology" • J. O'Hanlon, Third ed. & course notes

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An Introduction to Ion Sources: Principles and Techniques

1-day course, 5/22/06 Cost: $575.00

Course Objectives

- Learn about ion formation, ionization, and recombination collisions.
- Understand gaseous breakdown and plasma formation.
- Know the collective behavior of particles in electric and magnetic fields.
- Understand the operating principles of widely used ion sources.

- Learn about extraction and transport of the ion beam from ion sources.
- Know design and fabrication of ion sources and materials limitations.
- Learn about applications of ion beams and sources in research and industry.

Course Description

This course includes elementary atomic collisions, rudimentary plasma physics, essentials of gaseous discharges, principles of ion sources, and the basics of ion beam formation. It also emphasizes the applications and operating characteristics of commonly used ion sources: microwave, RF, DC discharges, multiply charged, negative, and novel. In each case, an ion source is described by the method in which the ions are formed and extracted in the form of an ion beam. Materials used for constructing electrodes and chambers are also discussed.

Who Should Attend?

Technicians, engineers, scientists, and supervisory personnel involved in the design, fabrication, installation, and operation of commonly used ion sources.

Instructor:

Abe Ghanbari, Vice President of engineering at Dielectric Systems, Inc.

Course Materials: Course Notes

Vacuum Vessel Engineering

1-day course: 5/22/06 Cost: $575.00

Course Objectives

- Identify your vessel performance requirements by analyzing and managing risk.
- Review standard and unconventional structural and mechanical design solutions.
- Understand the affects of vessel design on vacuum pump down and ultimate pressure.
- Learn practical acquisition strategies, including vendor qualification, contract options, and Statements of Work, while containing costs with appropriate specifications.
- Add up-to-date vacuum vessel resources to your toolbox.

Course Description

Vacuum vessels are basic infrastructure workhorses in a tremendous variety of applications and industries, including aerospace, microelectronics, lasers, and high-energy physics. A vacuum vessel is often a large capital investment that has a major impact on the cost, schedule, and technical performance of a system. Success in designing or specifying a vessel to meet aggressive requirements relies on a careful assessment of present and future operations and a graded approach to managing risk. Early decisions can have enormous leverage on not only the initial acquisition, but also the long-term operability and efficiency of the facility that it serves.
This course will review practical issues to consider when deploying vacuum vessels from bench scale to 100+ tons. The use and limitations of national standards, such as the ASME Boiler and Pressure Vessel code will be presented. Sample calculations are presented for spherical, cylindrical, and rectangular shells. Numerous examples of real vessel designs are shown. Additional topics include fabrication, cleaning, and installation; safety margins, weld details, pressure relief, windows and seal designs. The course offers guidance for choosing an appropriate acquisition strategy, including a review of specification options and when to use them. Resources

provided include codes and standards references, sample procedures and forms, commercial components, vendor contacts, government agencies, and web links.
Attendees are encouraged to bring case studies from their workplace. Time will be reserved discuss vacuum vessel issues of specific interest to the course participants.

WHO SHOULD ATTEND?
The course will be helpful to project engineers, designers, or scientists responsible for specifying, designing, or procuring vacuum vessels.

INSTRUCTOR:

JOEL BOWERS, PROJECT ENGINEER, LLNL

COURSE MATERIALS: Course Notes

PLASMA-ENHANCED CVD: FUNDAMENTALS, TECHNIQUES AND APPLICATIONS

1-DAY COURSE: 5/22/06 COST: $575.00

COURSE OBJECTIVES

- Learn how PECVD is used in a wide variety of commercial applications.
- Understand how the basic process parameters affect materials and device properties.
- Understand the basic principles of plasma equipment design.
- Know the important trends in current commercial equipment and fabrication processes.

COURSE DESCRIPTION
This course reviews the basics of processing plasmas. This knowledge is applied to understand the practical complications when plasmas are used to deposit thin films in demanding device applications. Every attempt is made to develop an understanding of the relationship between the process and film properties based on practical examples.
The deposition and properties of important materials such as silicon oxide, silicon nitride, silicon carbide, amorphous and polycrystalline silicon, diamond and diamond-like carbon are discussed in detail.
Much emphasis is placed on an up-to-date discussion of hardware and hardware consideration as they apply to process control and process safety.
Important trends in the design and operation of commercial equipment, particularly as it relates to microelectronics, are discussed in detail.

WHO SHOULD ATTEND?
Those who want to get a good understanding of plasma-based deposition techniques, materials and devices both in commercial and laboratory applications.

INSTRUCTOR:

FRANK JANSEN, VICE PRESIDENT OF TECHNOLOGY AND ENGINEERING, BOC EDWARDS

COURSE MATERIALS: Course Notes and “Plasma-Enhanced CVD: Fundamentals, Techniques, and Applications” from the AVS monograph series

Thin and Ultra-thin Film Analysis, Characterization, and Metrology for the Wafer Processing Industry

1-day course: 5/22/06 Cost: $575.00

Course Objectives

- Become familiar with the materials being introduced, and their applications, as films get thinner.
- Understand which parameters need controlling and the different requirements for Lab analysis/ characterization and Fab metrology.
- Learn the basics of the commercially available techniques for analysis and for metrology of very thin films. Understand their limitations and learn about emerging commercially available tools for analysis of ultra-thin films.

Course Description

This course provides a working knowledge of the commercially available techniques used in the semiconductor industry for analyzing very thin to ultra-thin films (elemental and chemical composition, composition variation with depth, dopant distribution, surface and interface roughness, crystallinity/amorphicity/grain size, surface and interface contamination and reaction, surface and interface roughness, film hardness).

On the Fab metrology side (meaning rapid, robust determination to a known precision on wafers, without expert intervention), the most common specification is thickness. Composition and electrical properties, such as junction depth for implant and equivalent oxide thickness (EOT) for dielectrics, may also be under spec. All these are discussed.

Films are getting thinner at each technology node. Currently gate oxide thickness is 20 to 30A in production and 12A in development. Back end films, such as barrier layers are 100's A in production and sub 50A in development. Both analysis, and precision in metrology, get more difficult as the films get thinner. At the same time the artifacts of surface and interface reaction/contamination/roughness become more important. Many of the techniques/tools in standard use for analysis/metrology are running out of steam and new ones (or new versions of old ones) are being developed and commercially introduced.

The course will include (but is not limited to) discussion on ellipsometry, XRR, XRF (and combination of these in commercial metrology tools), acoustic wave methods (such as the Rudolph Scientific MetaPulse tool), AFM, XPS (both standard and Angle Resolved), Low Energy X-Ray Emission (LEXES), electron microscopy cross-sectional methods, SIMS, and some non-contact electrical methods. Discussion will be largely limited to what is commercially available and suitable for semiconductor material support labs (where "engineering mode" usage provides more detailed characterization) and/or metrology in the Fab in "operator mode."

Who Should Attend?

Process and defect engineers, yield engineers, analytical engineers, failure analysis/material engineers, anyone with responsibility or interest in film development and integration.

Instructor:

C.R. Brundle, C.R. Brundle & Associates

Course Materials: Course Notes

Plasma Etching and RIE: Fundamentals and Applications

2-day course: 5/23- 24/06 or 1-day course

Cost: $575 (Plasma Etching and RIE: Fundamentals)

$850 (Plasma Etching and RIE: Fundamentals and Applications)

Course Objectives:

The Fundamentals

- Know the basic concepts of plasma etching.
- Understand the physics of RF glow discharges (both high and low density).
- Understand the surface science aspects of reactive ion etching (RIE).
- Learn about plasma-surface chemistry leading to etching.
- Recognize the factors that influence etching anisotropy.

Applied Aspects

- Know fluorocarbon plasma etching of Si and its compounds.
- Learn about etching of Al, organics, III-V compounds, etc.
- Understand selectivity, loading effects, ARDE, uniformity, damage, feature charging, particles, wall reactions, etc.
- Become familiar with plasma diagnostics.

Course Description

The first day of this course covers plasma-assisted etching phenomena and equipment in a manner that will assist the attendee in understanding and developing plasma etching and RIE processes. The emphasis will be on the fundamental physical and chemical processes that determine the consequences of a reactive gas plasma/ surface interaction. The role of energetic ions as encountered in RIE systems and the factors that influence anisotropy of etching will be described. Many kinds of plasma-assisted etching equipment will be discussed, including capacitively coupled, inductively coupled, and wave-generated plasma sources.

The second day of this course covers the applied aspects of plasma-assisted etching. Emphasis will be on mechanistic understanding as opposed to specific processing issues, recipes, and problems. The etching of Si and its compounds will be covered in detail as well as the etching of other technology-related materials such as Al, organics, III-V compounds, etc. Topics such as selectivity, loading, ARDE, damage, and issues associated with high-density plasma RIE will be covered. A section on plasma diagnostics will focus on optical emission spectroscopy with actinometry, mass spectrometry, and laser-induced fluorescence.

Who Should Attend?

Scientists, technicians, and others working with or interested in the dry etching of materials in reactive gas glow discharges, particularly those who do not have extensive experience in the field.

Instructors:

Randy Shul, Technical Staff, Sandia National Laboratories

Course Materials: Course Notes

Operation and Maintenance of Vacuum Pumping Systems

2-day course: 5/23 - 24/06 Cost: $950.00

Course Objectives:

- Learn to operate vacuum pumping systems efficiently with minimum downtime.
- Learn about preventive maintenance on pumps and pumping systems.
- Understand leak detection in operating vacuum systems.
- Learn to troubleshoot and test the performance of vacuum pumping systems.

Course Description:

The major thrust of this course is to show how vacuum pumping systems can be operated most effectively, to achieve maximum performance while holding downtime for maintenance to a minimum. Typical procedures used for systems that employ oil-sealed rotary, Roots, vapor diffusion, turbo-molecular, sputter-ion, and cryogenic pumps are described. There are also discussions of possible variations in typical procedures that may be used in special cases.

Troubleshooting and performance-testing techniques are presented as well as methods of leak detection that are most effective for operating vacuum systems.

Who Should Attend?

Those who want to learn how to properly operate vacuum systems themselves or are responsible for people who operate them. Knowledge of operating limits and general characteristics of pumps, gauges, and other auxiliary equipment used in vacuum systems is needed.

Instructor:

Jack Singleton, Consultant.

Course Materials: Course Notes & Textbook “Users Guide to Vacuum Technology”

Thin-Film Deposition by Evaporation

1-day course: 5/23/06 Cost: $575.00

Course Objectives

- Understand the fundamental physics and chemistry of the deposition of thin films by vacuum evaporation.
- Know the applicability of the various evaporation processes to practical manufacturing.
- Learn the fundamental and practical advantages and limitations of the technology.

Course Description

Thermal evaporation is an important technology for the formation of decorative and functional coatings on a variety of materials. This course is an introduction to the fundamentals of deposition of thin films by thermal evaporation in a vacuum. Topics covered include: the vacuum environment, vaporization and vapor sources (resistance and electron-beam heated), vapor transport, film condensation and growth, control of thickness and

uniformity, the effects of deposition conditions on film structure and stress, reactive and ionized evaporation processes, and the advantages and disadvantages of evaporation vs. other film deposition processes.
Process examples from application areas familiar to the attendees are included. Class discussion of practical problems and solutions is encouraged.

WHO SHOULD ATTEND?
This course is intended for technicians, engineers, and supervisors who have had no previous experience with evaporation methods. A background in elementary physics and chemistry is helpful.

INSTRUCTOR:

ROBERT WAITS, CONSULTANT

COURSE MATERIALS: Course Notes & Thin Film Deposition and Patterning monograph

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FOCUSED ION BEAMS: PRINCIPLES AND APPLICATIONS

1-DAY COURSE: 5/23/06 COST: $575.00

COURSE OBJECTIVES

- Become familiar with the principles of the generation and control of focused ion beams (FIBs).
- Know the capabilities of current instrumentation.
- Learn the varied applications of FIB techniques in manufacturing and research.

COURSE DESCRIPTION
This one-day course begins with a discussion of the evolution and principles of operation of the liquid metal ion source (LMIS). The ion optics and features of the ion column are then presented, and then the way these components are incorporated into a FIB system is shown, along with a discussion of current FIB instrumentation.
The interaction of ions with matter is presented to the extent needed to understand the sputtering process. Sputtering yield as a function of sputtering ion parameters is investigated. Explanation is made of the ion beam assisted chemical vapor deposition (CVD) process and the gas source method that is used to improve etch rate. The ability to sputter and deposit at less than 10 nm resolution makes possible a wide range of FIB applications. Applications discussed include:

- Imaging – grain size measurements.
- Ion implantation – few nm lateral resolution.
- Mask repair – modification and defect removal.
- Micro-machining – hard disk write heads, micro-mechanical systems (MEMS).
- Integrated circuit (IC) modification – cut-and-paste operations.
- Scanning electron microscopy (SEM) sample preparation – failure analysis techniques.
- Transmission electron microscopy (TEM) sample preparation – site-specific capability.
- Secondary ion mass spectrometry (SIMS) – description of SIMS process, lateral resolution, sensitivity.

Who Should Attend?
Scientists, engineers, and others who would like to be able to determine the concentration of elements as a function of depth from a solid surface.

Instructor:

Jon Orloff, Professor, University of Maryland; Fred Stevie, North Carolina State University, Senior Researcher

Course Materials: Course Notes

Basics of Radio Frequency Technology

2-day course: 5/24 - 25/06 Cost: $850.00

Course Objectives

- Understand the radio frequency (RF) plasma system as an electronic circuit.
- Learn a systematic approach to viewing a RF plasma system.
- Know techniques for maintaining and troubleshooting RF systems.

Course Description
This introductory course provides maintenance and equipment engineers and technicians with a basic working knowledge of RF technology as it is applied to semiconductor processing equipment.
The role of RF in the various deposition processes, including sputter deposition and etching systems, is discussed. The characteristics and uses of various components that make up an RF system are described. The differences between resistive and reactive components are explained as well as the differences between series and parallel resonance.
Under reactive components, the course covers tuning circuits, filter circuits, and the plasma chamber itself. The use of inductive versus capacitive coupling of RF power into the plasma discharge is reviewed as well as methods for measuring target and substrate voltages and their relation to ion energies.
The course also includes discussions of the operation and use of RF power amplifiers, transmission lines, and matching networks.

Who Should Attend?
Engineers and equipment technicians who use RF power in vacuum systems and require a working knowledge of RF fundamentals.

Instructor:

Steve Barber, Vice President, RF VII

Course Materials: Course Notes

Data Processing in XPS/ESCA and AES

1-day course: 5/24/06   Cost: $575.00

Course Objectives

- Learn details about processing data acquired in the analysis of surfaces with x-ray photoelectron spectroscopy (XPS)/electron spectroscopy for chemical analysis (ESCA), and Auger electron spectroscopy.
- Learn approaches for background subtraction/removal.
- Learn approaches for curve fitting spectra.
- Learn approaches for quantitative analysis.
- Learn advanced data processing methods such as least squares fitting and factor analysis in depth profiling and imaging.

Course Description

XPS and AES are used to determine the atoms present at a surface, and their concentrations, chemistries, and lateral and depth distributions. This course will show attendees how to process and evaluate XPS and AES spectra:

- Spectra – the many features present in spectra will be described.
- Background subtraction methods will be described and compared.
- Shapes of peaks will be described and approaches for curve fitting will be illustrated.
- Approaches for quantitative analysis will be demonstrated and errors illustrated.
- Data processing methods to improve images will be demonstrated.
- Data processing methods for near-surface, non-destructive depth profiling will be illustrated.
- Data processing methods to remove peak overlap problems, separate different chemical states, and improve signal-to-noise in sputter depth profiles will be demonstrated.

Who Should Attend?

Scientists, engineers, students, and technicians who would like to be able to process XPS/ESCA or AES spectra in order to obtain as much information from the spectra as possible.

Instructor:

John Grant, Distinguished Research Scientist, Research Institute, University of Dayton

Course Materials:

Course Notes, including a comprehensive list of free and commercial software.

Atomic Layer Deposition: Fundamentals, Chemistry and Applications

1-day course: 5/25/06   Cost: $575.00

Course Objectives

- Learn the fundamentals of ALD: basic principles, advantages and limitations
- Understand why ALD processes are dependent on precursor properties and reactivity
- Learn the key aspects of various ALD reactors

- Learn how ALD processes and films are characterized in-situ and ex-situ
- Know the potential applications of ALD and future trends in ALD research

COURSE DESCRIPTION

This course will develop a basic understanding of the atomic layer deposition (ALD) technique and apply that to the detailed understanding of the ALD chemistry of oxides, nitrides, sulfides and metals. Precursor requirements and various ALD reactor configurations will be reviewed. The details involved in efficient ALD flow tube reactor design will also be covered.

Measuring ALD growth rates, monitoring ALD chemistry and analyzing thin film properties are necessary to characterize ALD thin films. In-situ and ex-situ methods for analyzing ALD grown films will be covered. This includes spectroscopic ellipsometry, quartz crystal microbalance (QCM), X-ray diffraction and reflectivity, Auger spectroscopy, mass spectrometry, infrared spectroscopy, and x-ray photoelectron spectroscopy (XPS). Examples of each technique will be presented and discussed.

ALD is finding applications in many diverse areas of technology. This class will survey the potential uses of ALD in gate dielectric formation in microelectronics, composite structures for X-ray optics, coatings for MEMS devices, and diffusion barriers for corrosion resistance in polymer electronics. Potential avenues of future ALD research will be mentioned.

WHO SHOULD ATTEND?

Technicians, engineers and scientists who either have an interest or need to learn about the basic principles of ALD or a desire to keep up to date or broaden their knowledge of this rapidly expanding technique of thin film deposition.

INSTRUCTOR:

ROBERT K. GRUBBS, SENIOR MEMBER • TECHNICAL STAFF, SANDIA NATIONAL LABORATORIES

COURSE MATERIALS: Course Notes & a reprint of the chapter "Atomic Layer Deposition" from Handbook of Thin Film Materials, Academic Press.

VACUUM LEAK DETECTION

1-DAY COURSE: 5/25/06 COST: $575.00

COURSE OBJECTIVES

- Learn how to analyze vacuum systems and other closed systems for leaks during operation.
- Learn to use mass spectrometer leak detectors and residual gas analyzers to locate and measure leaks.
- Know the most effective ways to connect a mass spectrometer leak detector or residual gas analyzer to a vacuum system.

COURSE DESCRIPTION

This course is an introduction to the technology and practice of leak detection. It includes a discussion of the types of leaks that are to be expected in vacuum systems and how they affect the leakage rate. The principles of leak detection and the methods of putting these principles into practice are described. Practical techniques for detecting and locating leaks are provided with special attention to making the most effective use of the mass spectrometer leak detector.

Also covered in detail are the various ways in which mass spectrometer leak detectors can be connected to vacuum systems and their effects on obtaining satisfactory results from the test procedures. A method of

verifying the effectiveness of the leak detection system before starting a test is described. The use of a residual gas analyzer (RGA), a partial pressure gauge, in detecting leaks and analyzing vacuum system difficulties is also discussed.

Who Should Attend?

Those involved in leak detection of vacuum and other closed systems and those who need to evaluate whether a given leak rate is acceptable or unacceptable. A working knowledge of vacuum equipment and instrumentation and familiarity with the basic equations for throughput, pumping speed, and conductance is helpful.

Instructor:

Mike Benapfl, Engr Technical Assoc., Mechanical Engr Dept, LLNL

Course Materials: Course Notes

Depth Profiling

1-day course: 5/25/06 Cost: $575.00

Course Objectives

- Learn the compositional depth profiling (CDP) methods.
- Understand the advantages, limitations, and artifacts of each CDP method.
- Learn to optimize depth resolution.
- Know the advantages and limitations of each surface analysis technique when combined with sputtering.

Course Description

Depth profiling can be used to identify the elements present as a function of depth into the solid; applications include thin films, the composition at buried interfaces, and the depth distribution of ion implants in materials. Both nondestructive and destructive methods are discussed, including the advantages and limitations of each. The course emphasis is on the use of Rutherford backscattering spectrometry (RBS) for nondestructive depth profiling and on the use of sputtering together with x-ray photoelectron spectroscopy (XPS), Auger electron spectroscopy (AES), ion scattering spectroscopy (ISS), and secondary ion and neutral mass spectrometries (SIMS, SNMS) for destructive depth profiling. The treatment of sputtering includes the physical basis for sputtering, sputtering yields, erosion rates, and crater formation. Artifacts associated with the sputtering process and those inherent in the various surface analysis techniques are discussed.
Many examples are given to illustrate applications of each method for obtaining the compositional depth profile. Procedures for quantifying both the concentration of elements and the depth scale are compared. Upon completion, the attendee should be able to determine when and where to use compositional depth profiling methods, select the best surface analysis techniques on the basis of their relative merits, and avoid the pitfalls in their use.

Who Should Attend?

Scientists, engineers, and others who would like to be able to determine the concentration of elements as a function of depth from a solid surface.

Instructor:

John Grant, Senior Research Scientist, Research Institute, University of Dayton

Course Materials: Course Notes

2006 Short Courses
May 22-26, 2006
The Embassy Suites Hotel • Albuquerque

Short Course Coordinator

David P. Adams
Sandia National Laboratories
505 844.8317

Short Course Registration & Arrangements

Cheryl M Brozena
University of New Mexico
505 277.5433 • fax or 505 255.8658 • phone/fax

first name		last name	
company			
address			
city		state	
zip		phone	
fax		email	
job position		years in technology	
student scholarship			

Course	
Basic Vacuum Technology • $1,495 • May 22-26	
Intro to Ion Sources • $575 • May 22	
Vacuum Vessel Engineering • $575 • May 22	
Plasma-Enhanced CVD • $575 • May 22	
Thin and Ultra Thin Film Analysis • $575 • May 22	
Plasma Etching & RIE • $850 • May 23-24	
Operation & Maintenance • $950 • May 23-24	
Thin-Film Deposition by Evap. • $575 • May 23	
FIB: Principles & Applications • $575 • May 23	
Basics of Radio Frequency Tech. • $850 • May 24-25	
Data Processing in XPS/ESCA & AES • $575 • May 24	
Atomic Layer Deposition • $575 • May 25	
Vacuum Leak Detection • $575 • May 25	
Depth Profiling • $575 • May 25	
Total Amount	

Payment	Check		Visa		Mastercard	
Credit Card Number						
Expiration (mm/dd/yy) • Name on Credit Card						

Checks payable to: NMCAVS • Return via fax: 505 255.8658 or 505 277.5433

Return via mail: Cheryl M. Brozena, 1213 Georgia NE, Albuquerque, NM 87110

2006 Vacuum Equipment Exhibit

aka Vendor Show

May 23, 2006

Show Hours • 9:30 am to 3:30 pm
Complimentary Lunch Buffet • 11:30 am - 1:30 pm

The Chapter organizes and sponsors a 1-day Vendor Exhibit during each Annual Symposium in the Spring. The show, free to attendees, is a unique opportunity to meet representatives of 40 local and national companies and to see and discuss the latest innovations in vacuum technology. The Chapter provides a variety of services during the show in order to facilitate communication between suppliers and users of vacuum equipment. The Chapter provides each attendee with a complimentary exhibit directory that details the goods and services of each vendor, including company contacts. The Chapter also provides each vendor with a list of the registered attendees to facilitate future contact between the suppliers and users. The Chapter provides door prizes for registered attendees of the show. A free buffet luncheon and all refreshments for the symposium and short courses are served in the exhibit hall the day of the show.

If you are interested in participating as a Vendor or know of company who might be interested in the Exhibit, please contact the Vendor Exhibit Coordinator.

For more information on the Vendor Exhibit, please contact the New Mexico Chapter Vendor Exhibit Coordinator, Guild Copeland, at 505 284.2694.

Vendors Registered as of 04/12/06

A&N Corporation
ADE Phase Shift
Albuquerque Valve & Fitting Co
Alcatel Vacuum Products
BOC Edwards
CeramTec North America
Geller Microanalytical Lab
Hiden Analytical Inc.
HORIBA Jobin Yvon Inc.
Huntington Mechanical Labs
J B Technical, LLC
Key High Vacuum Products
Kratos Analytical Inc.
Kurt J. Lesker Co.
Nor-Cal Products
Pfeiffer Vacuum
Physical Electronics, Inc
Prima West Sales, Inc.
Scientific Sales Associates, Inc.
Televac
Transfer Engineering & Manufacturing
Vacnet Inc.
Vacuum Engineering & Materials
Varian Vacuum Products
VAT Inc.
Walker Hi-Tech, Inc.
Williams Associates

Cheryl M. Brozena
ANS/NMC Local Arrangements
Chemical and Nuclear Engineering
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