Glow Discharge Optical Emission Spectroscopy A Practical Rsc Analytical Spectroscopy Series

Integrating advances in instrumentation and methods, this work offers an approach to solving problems in surface and interface analysis, beginning with a particular problem and then explaining the most rational and efficient route to a solution. The book discusses electron optical and scanned probe microscopy, high spatial resolution imaging and synchrotron-based techniques. It emphasizes problem-solving for different classes of materials and material function.

Glow Discharge Optical Emission Spectrometry (GD-OES) is rapidly becoming one of the most important techniques for the direct analysis of solids. This, the first book entirely devoted to the subject, represents the combined contributions of over 30 specialists from around the world. All contributors are active in the field and recognised internationally for their expertise and knowledge in GD-OES. The book begins with an introductory overview of the subjects, deals with the design of the instrument, its operation and analytical methods and describes in detail the complex plasma processes which occur inside the glow discharge source. The second part of the book is more practically orientated, showing the full range of uses for GD-OES from the bulk analysis of virtually any solid material to depth profiling within the first tens of micrometres of a variety of surfaces and coatings. Glow Discharge Optical Emission Spectrometry is intended for a wide audience of scientists, engineers and postgraduate students and will be a valuable and challenging reference work for both experienced users of the technique and newcomers alike.

Chemical analysis and testing, Surfaces, Surface properties, Vocabulary, Definitions, Spectroscopy

Glow Discharge Optical Spectroscopy (GDOS) was used as a technique for obtaining impurity concentration profiles of annealed and unannealed ion implanted GaAs samples. Germanium, magnesium, and boron ions were implanted at energies of 60keV or 120keV and fluences of 1 or 5 times 10 to the 15th power/sq.cm. The samples were sputtered in a dc glow discharge. The intensities of strong emission lines (proportional to concentration) were calibrated using pure elements as standards, providing impurity concentration profiles. (Author).

Control of Coated Steel Products

An Optical Emission Study on DC Plasma Polymerization

Glow Discharge Plasmas in Analytical Spectroscopy

Methods for Problem-Solving

A Practical Guide

The book focuses on advanced characterization methods for thin-film solar cells that have proven their relevance both for academic and corporate photovoltaic research and development. After an introduction to thin-film photovoltaics, highly experienced experts report on device and materials characterization methods such as electroluminescence analysis, capacitance spectroscopy, and various microscopy methods. In the final part of the book simulation techniques are presented which are used for ab-initio calculations of relevant semiconductors and for device simulations in 1D, 2D and 3D. Building on a proven concept, this new edition also covers thermography, transient optoelectronic methods, and absorption and photocurrent spectroscopy.

Over the last forty years a wide range of surface coatings have been developed to address the surface stability and thermal insulation of materials used in the gas turbine section of aero, industrial and land-based power generation equipment. High Temperature Surface Engineering, the Proceedings of the Sixth International Conference in the Series 'Engineering the Surfaces', reviews the surfacing technologies appropriate to oxidation, corrosion and thermal protection. Factors which underpin their choice for any given application are discussed in the proceedings. This highlights the importance of developing representative mechanical and physical test methods to elucidate coating degradation modes as an aid to establishing coating systems with improved engineering performance. During the organisation of the conference and in the compiling of this book we have been privileged to work with many of the leading specialists in the field of High Temperature Surface Engineering and it is our hope that this book will be a valuable reference guide for Engineers and Material Scientists.

In response to the demands of contemporary solid material analysis-greater powers of detection, speed, depth, and precision-glow devices are receiving increased attention by specialists. This volume covers fundamental plasma processes, laser-based methods, thin film analysis, and many other processes to provide the researcher with an extensive technical reference of these devices.

Although based on lectures given for graduate students and postgraduates starting in plasma physics, this concise introduction to the fundamental processes and tools is as well directed at established researchers who are newcomers to spectroscopy and seek quick access to the diagnostics of plasmas ranging from low- to high-density technical systems at low temperatures, as well as from low- to high-density hot plasmas. Basic ideas and fundamental concepts are introduced as well as typical instrumentation from the X-ray to the infrared spectral regions. Examples, techniques and methods illustrate the possibilities. This book directly addresses the experimentalist who actually has to carry out the experiments and their interpretation. For that reason about half of the book is devoted to experimental problems, the instrumentation, components, detectors and calibration.

Glow Discharge Spectroscopies

Low Alloyed Steel. Determination of C, Si, Mn, P, S, Cr, Ni, Al, Ti and Cu. Glow Discharge Optical Emission Spectrometry (routine Method)

High Temperature Surface Engineering

Glow Discharge Optical Spectroscopy of Ion Implanted Gallium Arsenide

Characterization of He/CH4 DC Glow Discharge Plasmas by Optical Emission Spectroscopy, Mass Spectrometry and Actinometry

This book concisely illustrates the techniques of major surface analysis and their applications to a few key examples. Surfaces play crucial roles in various interfacial processes, and their electronic/geometric structures rule the physical/chemical properties. In the last several decades, various techniques for surface analysis have been developed in conjunction with advances in optics, electronics, and quantum beams. This book provides a useful resource for a wide range of scientists and engineers from students to professionals in understanding the main points of each technique, such as principles, capabilities and requirements, at a glance. It is a contemporary encyclopedia for selecting the appropriate method depending on the reader's purpose.

Materials for Ultra-Supercritical and Advanced Ultra-Supercritical Power Plants provides researchers in academia and industry with an essential overview of the stronger high-temperature materials required for key process components, such as membrane wall tubes, high-pressure steam piping and headers, superheater tubes, forged rotors, cast components, and bolting and blading for steam turbines in USC power plants. Advanced materials for future advanced ultra-supercritical power plants, such as superalloys, new martensitic and austenitic steels, are also addressed. Chapters on international research directions complete the volume. The transition from conventional subcritical to supercritical thermal power plants greatly increased power generation efficiency. Now the introductions of the ultra-supercritical (USC) and, in the near future, advanced ultra-supercritical (A-USC) designs are further efforts to reduce fossil fuel consumption in power plants and the associated carbon dioxide emissions. The higher operating temperatures and pressures found in these new plant types, however, necessitate the use of advanced materials. Provides researchers in academia and industry with an authoritative and systematic overview of the stronger high-temperature materials required for both ultra-supercritical and advanced ultra-supercritical power plants Covers materials for critical components in ultra-supercritical power plants, such as boilers, rotors, and turbine blades Addresses advanced materials for future advanced ultra-supercritical power plants, such as superalloys, new martensitic and austenitic steels Includes chapters on technologies for welding technologies

Plasma etching and desmear processes for printed wiring board (PWB) manufacture are difficult to predict and control. Non-uniformity of most plasma processes and sensitivity to environmental changes make it difficult to maintain process stability from day to day. To assure plasma process performance, weight loss coupons or post-plasma destructive testing must be used. These techniques are not real-time methods however, and do not allow for immediate diagnosis and process correction. These tests often require scrapping some fraction of a batch to insure the integrity of the rest. Since these tests verify a successful cycle with post-plasma diagnostics, poor test results often determine that a batch is substandard and the resulting parts unusable. These tests are a costly part of the overall fabrication cost. A more efficient method of testing would allow for constant monitoring of plasma conditions and process control. Process anomalies should be detected and corrected before the parts being treated are damaged. Real time monitoring would allow for instantaneous corrections. Multiple site monitoring would allow for process mapping within one system or simultaneous monitoring of multiple systems. Optical emission spectroscopy conducted external to the plasma apparatus would allow for this sort of multifunctional analysis without perturbing the glow discharge. In this paper, optical emission spectroscopy for non-intrusive, in situ process control will be explored along with applications of this technique to for process control, failure analysis and endpoint determination in PWB manufacture.

The Sixth International Conference on Miniaturized Chemical and Biochemical Analysis Systems, known as /JTAS2002, will be fully dedicated to the latest scientific and technological developments in the field of miniaturized devices and systems for realizing not only chemical and biochemical analysis but also synthesis. The first /JTAS meeting was held in Enschede in 1994 with approximately 160 participants, bringing together the scientists with background in analytical and biochemistry with those with Micro Electro Mechanical Systems (MEMS) in one workshop. We are grateful to Piet Bergveld and Albert van den Berg of MESA Research Institute of the University of Twente for their great efforts to arrange this exciting first meeting. The policy of the meeting was succeeded by late Prof. Dr. Michael Widmer in the second meeting, /JTAS'96 held in Basel with 275 participants. The first two meetings were held as informal workshops. From the third workshop, /JTAS'98 (420 participants) held in Banff, the workshop had become a worldwide conference. Participants continued to increase in /JTAS2000 (about 500 participants) held in Enschede and /JTAS2001 (about 700 participants) held in Monterey. The number of submitted papers also dramatically increased in this period from 130 in 1998, 230 in 2000 to nearly 400 in 2001. From 2001, /JTAS became an annual symposium. The steering committee meeting held in Monterey, confrrmed the policy of former /JTAS that quality rather than quantity would be the key-point and that the parallel-session format throughout the 3.

Analysis of Film Formation in Graphite Electrode of Li-ion Cells Using Glow Discharge Optical Emission Spectroscopy

Optical Emission Lines of the Elements

Plasma Process Control with Optical Emission Spectroscopy

Surface and Thin Film Analysis

Glow Discharge Lamp a Light Source for Optical Emission Spectroscopy

Surveying and comparing all techniques relevant for practical applications in surface and thin film analysis, this second edition of a bestseller is a vital guide to this hot topic in nano- and surface technology. This new book has been revised and updated and is divided into four parts - electron, ion, and photon detection, as well as scanning probe microscopy. New chapters have been added to cover such techniques as SNOM, FIM, atom probe (AP),and sum frequency generation (SFG). Appendices with a summary and comparison of techniques and a list of equipment suppliers make this book a rapid reference for materials scientists, analytical chemists, and those working in the biotechnological industry. From a Review of the First Edition (edited by Bubert and Jenett) "... a useful resource..." (Journal of the American Chemical Society)

In this study, plasma polymerization of hydrocarbon and silicon-carbon in DC glow discharges was investigated by using Optical Emission Spectroscopy (OES). In a DC glow discharge of organic compounds, the primary glow that develops at the cathode surface is the cathode glow and the negative glow as the secondary glow appears in a distance away from the cathode. OES data showed that there was a significant difference in the OES spectra obtained from cathode glow and negative glow. The polymer-forming species such as CH radicals dominated the OES spectrum of cathode glow. In contrast, the photo-emission from H atoms that do not polymerize comprised the OES spectrum of negative glow. These results indicate that the major reactions that contribute to DC plasma polymerization occurred in cathode glow rather than in negative glow.

Provides complete and up-to-date coverage of the foundational principles, enabling technologies, and specific instruments of portable spectrometry Portable Spectroscopy and Spectrometry: Volume One is both a timely overview of the miniature technologies used in spectrometry, and an authoritative guide to the specific instruments employed in a wide range of disciplines. This much-needed resource is the first comprehensive work to describe the enabling technologies of portable spectrometry, explain how various handheld and portable instruments work, discuss their potential limitations, and provide clear guidance on optimizing their utility and accuracy in the field. In-depth chapters—written by a team of international authors from a wide range of disciplinary backgrounds—have been carefully reviewed both by the editors and by third-party experts to ensure their quality and completeness. Volume One begins with general discussion of portable spectrometer engineering before moving through the electromagnetic spectrum to cover x-ray fluorescence (XRF), UV-visible, near-infrared, mid-infrared, and Raman spectroscopies. Subsequent chapters examine microplasmas, laser induced breakdown spectroscopy (LIBS), nuclear magnetic resonance (NMR) spectroscopy, and a variety of portable mass spectrometry instrument types. Featuring detailed chapters on DNA instrumentation and biological analyzers—topics of intense interest in light of the global coronavirus pandemic—this timely volume: Provides comprehensive coverage of the principles and instruments central to portable spectroscopy Includes contributions by experienced professionals working in instrument companies, universities, research institutes, the military, and hazardous material teams Discusses special topics such as smartphone spectroscopy, optical filter technology, stand-off detection, and MEMS/MOEMS technology Covers elemental spectroscopy, optical molecular spectroscopy, mass spectrometry, and molecular and imaging technologies Portable Spectroscopy and Spectrometry: Volume One is an indispensable resource for developers of portable instruments, civilian and government purchasers and operators, and teachers and students of portable spectroscopy. When combined with Volume Two, which focuses on the multitude of applications of portable instrumentation, Portable Spectroscopy and Spectrometry provides the most thorough coverage of the field currently available.

CHEMICAL ANALYSIS AND TESTING, SURFACE CHEMISTRY, SURFACES, SPECTROSCOPY, CHEMICAL COMPOSITION, THICKNESS, MASS, QUANTITATIVE ANALYSIS, OPTICAL MEASUREMENT, GLOW DISCHARGES

Introduction to Plasma Spectroscopy

Automated Plasma Control with Optical Emission Spectroscopy

Portable Spectroscopy and Spectrometry, Technologies and Instrumentation

Compendium of Surface and Interface Analysis

Glow Discharge Optical Emission Spectroscopy

This book, the third in a series of four publications issued annually as a deliverable of the research school established within the European Network of Excellence CMA (for Complex Metallic Alloys), is written by reputed experts in the fields of surface physics and chemistry, metallurgy and process engineering. It combines expertise found inside as well as outside the network. The CMA network focuses on the huge group of largely unknown multinary alloys and compounds formed with crystal structures based on giant unit cells containing clusters, with many tens or up to thousands of atoms per unit cell. In these phases, for many phenomena, the physical length scales are substantially smaller than the unit-cell dimension. Hence, these materials offer unique combinations of properties which are mutually excluded in conventional materials: metallic electric conductivity combined with low thermal conductivity, combination of good light absorption with high-temperature stability, combination of high metallic hardness with reduced wetting by liquids, electrical and thermal resistance tuneable by composition variation, excellent resistance to corrosion, reduced cold-welding and adhesion, enhanced hydrogen storage capacity and light absorption. This book series will concentrate on the: development of fundamental knowledge with the aim of understanding materials phenomena, technologies associated with the production, transformation and processing of knowledge-based multifunctional materials, surface engineering, support for new materials development and new knowledge-based higher performance materials for macro-scale applications.

Plasma processes for cleaning, etching and desmear of electronic components and printed wiring boards (PWB) are difficult to predict and control. Non-uniformity of most plasma processes and sensitivity to environmental changes make it difficult to maintain process stability from day to day. To assure plasma process performance, weight loss coupons or post-plasma destructive testing must be used. The problem with these techniques is that they are not real-time methods and do not allow for immediate diagnosis and process correction. These methods often require scrapping some fraction of a batch to insure the integrity of the rest. Since these methods verify a successful cycle with post-plasma diagnostics, poor test results often determine that a batch is substandard and the resulting parts unusable. Both of these methods are a costly part of the overall fabrication cost. A more efficient method of testing would allow for constant monitoring of plasma conditions and process control. Process failures should be detected before the parts being treated. are damaged. Real time monitoring would allow for instantaneous corrections. Multiple site monitoring would allow for process mapping within one system or simultaneous monitoring of multiple systems. Optical emission spectroscopy conducted external to the plasma apparatus would allow for this sort of multifunctional analysis without perturbing the glow discharge. In this paper, optical emission spectroscopy for non-intrusive, in situ process control will be explored. A discussion of this technique as it applies towards process control, failure analysis and endpoint determination will be conducted. Methods for identifying process failures, progress and end of etch back and desmear processes will be discussed.

Chemical Imaging Analysis covers the advancements made over the last 50 years in chemical imaging analysis, including different analytical techniques and the ways they were developed and refined to link the composition and structure of manmade and natural materials at the nano/micro scale to the functional behavior at the macroscopic scale. In a development process that started in the early 1960s, a variety of specialized analytical techniques was developed – or adapted from existing techniques – and these techniques have matured into versatile and powerful tools for visualizing structural and compositional heterogeneity. This text explores that journey, providing a general overview of imaging techniques in diverse fields, including mass spectrometry, optical spectrometry including X-rays, electron microscopy, and beam techniques. Provides comprehensive coverage of analytical techniques used in chemical imaging analysis Explores a variety of specialized techniques Provides a general overview of imaging techniques in diverse fields

Plasma Polymer Films examines the current status of the deposition and characterization of fluorocarbon-, hydrocarbon- and silicon-containing plasma polymer films and nanocomposites, with plasma polymer matrix. It introduces plasma polymerization process diagnostics such as optical emission spectroscopy (OES, AOES), and describes special deposition techniques such as atmospheric pressure glow discharge. Important issues for applications such as degradation and stability are treated in detail, and structural characterization, basic electrical and optical properties and biomedical applications are discussed.

The Application of Glow Discharge Optical Emission Spectroscopy to the Study of Thermal Barrier and Environmental Coatings

Control of Coated Steel Products Setup of a Standard Method for Quantitative Depth Profile Analysis of Zn Based Coatings by Direct Current Glow Discharge Optical Emission Spectroscopy

Glow Discharge Optical Emission Spectrometry

Quantitative Studies of Glow-discharge Deposition Using Optical Emission Spectroscopy

Depth Elemental Characterization of 1D Self-aligned TiO2 Nanotubes Using Calibrated Radio Frequency Glow Discharge Optical Emission Spectroscopy (GDOES)

This resource shows how to do high quality depth profile analysis with a glow discharge spectrometer, as well as how glow discharge spectroscopy can produce accurate and analytically relevant surface depth profile information. Chapters give a detailed explanation of obtaining and manipulating these analytical measurements to provide an accurate quantitative picture of the analyzed layers. The book supplies both novice and experienced users with the tools to know when GDS analysis is appropriate, to understand what information to expect from this technology, to design analytical methodologies, and to evaluate the analytical results.

Alloy steels, Low-alloy steels, Glow discharges, Emission, Emission spectrophotometry, Spectroscopy, Data acquisition, Calibration

Glow discharge optical emission spectroscopy (GD-OES) is an analytical technique widely used for elemental and depth profiling analysis of materials 1. The technique is based on the analysis of the optical emission of atoms sputtered from the cathode and excited in the plasma. Radio frequency excitation of the glow discharge (RF-GD-OES) is developed for quantitative analysis of non-conductive samples. Capacitively coupled radio frequency discharges have been extensively studied both experimentally and theoretically over the past decade in the context of plasma processing for the microelectronics industry and thus these discharges are fairly well understood 2-3. The operating conditions used in RF-GDOES are, however, different than those standardly used in plasma processing, leading to a discharge behavior quite unusual and it is our aim to understand this behavior.

This multi-author, edited volume includes chapters which deal with both basic and highly complex applications. Glow discharge devices are now being used in very novel ways for the analysis of liquids and gases, including molecular species detection and identification, an area that was beyond the perceived scope of applicability just ten years ago. It is expected that the next decade will see a growth in the interest and application of glow discharge devices far surpassing the expectations of the last century. Responding to the rapid growth in the field Includes both GD-MS and GD-AES In-depth coverage of applications Co-edited by the top names in the field in Europe and US, with high calibre contributions from around the world

Optical Emission Studies of Reactive Species in Plasma Deposition

A Compendium of Principles, Instrumentation, and Applications

Recent Advances in Analytical Techniques Volume 1

Surface Chemical Analysis. General Procedures for Quantitative Compositional Depth Profiling by Glow Discharge Optical Emission Spectrometry

Materials for Ultra-Supercritical and Advanced Ultra-Supercritical Power Plants

Recent Advances in Analytical Techniques is a collection of updates in techniques used in chemical analysis. This volume presents information about a selection of analytical techniques. Readers will find information about: - New methods of sample preparation in biological and environmental analysis - Developments in electrochemical sensors - In vivo cytometry for detection of tumor cells - Flow discharge spectroscopy for depth profile analysis - Advances in photodynamic therapy - New methods to analyze volatility in alcoholic beverages

A unique CD-ROM and print package comprising a fully searchable electronic database of emission lines for nearly 90 elements and a practical reference manual. Breaking away from the traditional compendia of emission lines, the database has been compiled using an algorithm which calculated all the electric-dipole emission lines for each element based on their electronic structure. Therefore this product contains wavelengths for lines that are very weak and only observable under optimum conditions. There is no detection limit, and the programme allows the user to adjust parameters to match the general characteristics of their source and spectrometer, making this a highly authoritative resource. The CD-ROM provides many valuable features including: * Information about all atomic and first ionic state lines in the range of 100 nm to 900 nm (in air or vacuum) associated with the known energy levels for most elements from hydrogen to uranium * Calculated transition probabilities for all lines * A database that allows the user to plot the calculated spectrum matching their selection of elements and wavelength range * Adjustable parameters so that the database can be customised to match the general characteristics of the user's own source and spectrometer. Accompanying the CD-ROM is a reference handbook which includes: * Contains 961,000 lines from 88 elements and 172 spectra * A calculation of the atomic transition probabilities for all lines * Detailed introduction explaining the electronic structure of the atom and how the wavelengths and intensities within the text and CD-ROM were calculated. Written by experts in the field of Optical Emissions this multimedia package is an indispensable guide to researchers and analysts using other OES techniques, as well as the libraries of institutes involved in the research and teaching of atomic spectroscopy and manufacturers of ICP, arc, spark and glow discharge spectrometers.

Optical emission studies of the glow-discharge deposition of a-Si:H alloys reveal the presence of reactive species derived from process gases and impurities. Studies of the dependences of emission intensities upon deposition parameters elucidate the mechanisms of formation of these species. Effects of impurities detected by emission spectroscopy upon a-Si:H film electronic properties are discussed. A model of the chemical reactions involved in film growth is presented.

Glow Discharge Optical Emission SpectroscopyA Practical GuideRoyal Society of Chemistry

Springer Handbook of Metrology and Testing

Final Report

Surface Chemical Analysis. Glow Discharge Optical Emission Spectrometry (GD-OES). Introduction to Use

Encyclopedia of Plasma Technology - Two Volume Set

Radiofrequency Glow Discharges Used for Optical Emission Spectroscopy: An Experimental and Analytical Approach

This Springer Handbook of Metrology and Testing presents the principles of Metrology – the science of measurement – and the methods and techniques of Testing – determining the characteristics of a given product – as they apply to chemical and microstructural analysis, and to the measurement and testing of materials properties and performance, including modelling and simulation. The principal motivation for this Handbook stems from the increasing demands of technology for measurement results that can be used globally. Measurements within a local laboratory or manufacturing facility must be able to be reproduced accurately anywhere in the world. The book integrates knowledge from basic sciences and engineering disciplines, compiled by experts from internationally known metrology and testing institutions, and academe, as well as from industry, and conformity-assessment and accreditation bodies. The Commission of the European Union has expressed this as there is no science without measurements, no quality without testing, and no global markets without standards.

Technical plasmas have a wide range of industrial applications. The Encyclopedia of Plasma Technology covers all aspects of plasma technology from the fundamentals to a range of applications across a large number of industries and disciplines. Topics covered include nanotechnology, solar cell technology, biomedical and clinical applications, electronic materials, sustainability, and clean technologies. The book bridges materials science, industrial chemistry, physics, and engineering, making it a must have for researchers in industry and academia, as well as those working on application-oriented plasma technologies. Also Available Online This Taylor & Francis encyclopedia is also available through online subscription, offering a variety of extra benefits for researchers, students, and librarians, including: Citation tracking and alerts Active reference linking Saved searches and marked lists HTML and PDF format options Contact Taylor and Francis for more information or to inquire about subscription options and print/online combination packages. US: (Tel) 1.888.318.2367; (E-mail) e-reference@taylorandfrancis.com International: (Tel) +44 (0) 20 7017 6062; (E-mail) online.sales@tandf.co.uk

In this valuable work, all aspects of the reactive magnetron sputtering process, from the discharge up to the resulting thin film growth, are described in detail, allowing the reader to understand the complete process. Hence, this book gives necessary information for those who want to start with reactive magnetron sputtering, understand and investigate the technique, control their sputtering process and tune their existing process, obtaining the desired thin films.

Glow discharge optical emission spectroscopy (GDOES) is an essential technique for the direct analysis of bulk solids, for elemental surface analysis and for the depth profiling of thin films and industrial coatings. The technique has shown rapid growth in numbers of instruments, in breadth of applications, in improved quantification in recent years and is now a recognised technique within the ISO, with two international standards. Glow Discharge Optical Emission Spectroscopy: A Practical Guide takes the reader on a journey through instrument operation, sample preparation, analysis, and reporting results. It follows two sets of samples through the whole process of analysis, brass samples for bulk analysis, and zinc-coated steel for depth profiling. Procedures are consistent with recent ISO standards and each step is loaded with hands-on tips and theoretical insight. The book also includes unique data tables on spectral interferences, molecular bands, self-absorption and relative sputtering rates. This book is designed for those using or managing GDOES instruments and for students interested in learning the technique from a hands-on perspective. It is also an invaluable aid to those considering the purchase of a GDOES instrument, or those using GDOES results, to understand in detail how the technique works and what is involved in maintaining the instrument and achieving high quality results.

Advanced Characterization Techniques for Thin Film Solar Cells

Set Up of a Standard Method for Quantitative Depth Profile Analysis of Zn Based Coatings by Direct Current Glow Discharge Optical Emission Spectroscopy

Reactive Sputter Deposition

Plasma Polymer Films