Contamination Manufacturing For Semiconductors And Other Precision Products

Recognizing the need for

improved control measures in the manufacturing process of highly sensitized semiconductor technology, this practical reference provides in-depth and advanced treatment on the

origins, procedures, and disposal of a variety of contaminants. It uses contemporary examples based on the latest hardware and processing apparatus to

illustrate previously unavailable results and insights along with experimental and theoretical developments. Ensures the proper methods necessary to meet the

standards established in the 1997 National Technology Roadmap for Semiconductors (NTRS)! Summarizing up-to-date control practices in the industry, Contami nation-Free

Manufacturing for Semiconductors and Other Precision Products: Details the physics and chemistry behind the mechanisms leading to conta mination-induced failures Considers

particles and molecular contaminants, including the entire spectrum of mass-based contaminants Outlines primary contamination problems and target control levels Reveals

and offers solutions to inadequate areas of measurement capability and control technology Clarifies significant problems and decisions facing the industry by

analyzing NTRS standards and contamination mechanisms Containing over 700 literature references, drawings, photographs, equations, and tables, Contamination-Free

Manufacturing for Semiconductors and Other Precision Products is an essential reference for electrical and electronics, instrumentation, process, manufacturing,

development, contamination control and quality engineers; physicists; and upper-level undergraduate and graduate students in these disciplines. Contamination-

Free Manufacturing for Semiconductors and Other Precision ProductsCRC Press

This handbook will provide engineers with the principles, applications, and

solutions needed to design and manage semiconductor manufacturing operations. Consolidating the many complex fields of semiconductor fundamentals and

manufacturing into one volume by deploying a team of world class specialists, it allows the quick look up of specific manufacturing reference data across many subdisciplines.

Proceedings of the Third International Symposium on Corrosion and Reliability of Electronic Materials and Devices

A Manual for Putting Theory

into Practice Basic Guide for Students and Engineers in Semiconductor and FPD Manufacturing Including Material and Equipment Suppliers Developments in Surface

Contamination and Cleaning - Vol 6 High Purity and High Mobility Semiconductors 15

Chemical contaminants in materials used in the production of microwave

semiconductor diodes adversely affect the device yield. This report explores the relationship between chemical impurities in the solutions used in PIN diode manufacturing and the final yields. It also describes the applicability of spectral analysis

technology to ascertaining critical chemical imbalances in the various reagents and solvents. A computer-controlled spectrometer was used to measure trace metals at each of 50 subprocesses in the PIN diode production. These measurements

were amalgamated to comprise a database which was then subjected to detailed statistical analysis in an attempt to arrive at a specific relationship between chemical contamination and yield. No such relationship was discovered. The spectral analysis

technology proved useful for diagnosing chemical contamination which affected production yield. Specific problems involved in the production process and the resolutions provided through use of spectrometry are discussed. (Author). There is something Al

ice-in-Wonderlandish about powerful and vital computer systems being shut down by a microscopic mote that a hay-feverist wouldn't sneeze at, but as computer chips get smaller, smaller and smaller particles on their surface have a larger and larger effect on their

performance. In This book is about contamination control, which is an important technology for semiconductor and FPD production. Contamination control technology is an essential technology for improving product yield and improving

quality, which is essential for devices such as the latest semiconductors and OLEDs to succeed in mass production and make reasonable profits. Part 1 of this book was about particle control, starting with understanding the properties of

particles, and then covering controlling particles through clean rooms and controlling particles beyond clean rooms. Part 2 of this book is about static electricity control, and introduces the part controlling the adsorption of particles by static

electricity along with damage caused by static electricity. Together with our previous work, Cotamination Control for CEO and Engineers in IC & AMOLED Industry, we will continue our efforts to share the knowledge and experience necessary

for the production of semiconductors and FPDs in a series with the theme of Contamination Control.

Contamination Control for CEO and Engineers in IC and AMOLED Industry

Proceedings of the Symposium on Contamination

Control and Defect Reduction in Semiconductor Manufacturing II Detection, Characterization, and Analysis of Contaminants Robotics for Electronics Manufacturing Issues in Electronic Circuits, Devices, and

Materials: 2011 Edition

Principles and Applications in Cleanroom Automation

As device sizes in the semiconductor industries are shrinking, they become more vulnerable to smaller contaminant

particles, and most conventional cleaning techniques employed in the industry are not as effective at smaller scales. The book series Developments in Surface Contamination and Cleaning as a whole provides an excellent source of information on these alternative

cleaning techniques as well as methods for characterization and validation of surface contamination. Each volume has a particular topical focus, covering the key techniques and recent developments in the area. The chapters in this Volume address the

sources of surface contaminants and various methods for their collection and characterization, as well as methods for cleanliness validation. Regulatory aspects of cleaning are also covered. The collection of topics in this book is unique and complements

other volumes in this series. Edited by the leading experts in small-scale particle surface contamination, cleaning and cleaning control, these books will be an invaluable reference for researchers and engineers in R&D, manufacturing,

quality control and procurement specification situated in a multitude of industries such as: aerospace, automotive, biomedical, defense, energy, manufacturing, microelectronics, optics and xerography. Provides a state-of-the-art

survey and best-practice guidance for scientists and engineers engaged in surface cleaning or handling the consequences of surface contamination Addresses the continuing trends of shrinking device size and contamination vulnerability in a

range of industries, spearheaded by the semiconductor industry and others Includes new regulatory aspects In this series Rajiv Kohli and Kash Mittal have brought together the work of experts from different industry sectors and backgrounds to

provide a state-of-the-art survey and best-practice guidance for scientists and engineers engaged in surface cleaning or handling the consequences of surface contamination. The expert contributions in this volume cover important fundamental aspects

of surface contamination that are key to understanding the behavior of specific types of contaminants. This understanding is essential to develop preventative and mitigation methods for contamination control. The coverage complements the

treatment of surface contamination in vol.1, Fundamental and Applied Aspects. This volume covers: Sources and Generation of Particles; Manipulation Techniques for Particles on Surfaces; Particle Deposition and Rebound; Particle Behavior in

Liquid Systems; Biological and Metallic Contamination; and includes a comprehensive list of current standards and resources. Comprehensive coverage of innovations in surface contamination and cleaning Written by

established experts in the contamination and cleaning field Each chapter is a comprehensive review of the state of the art Case studies included
The contributions in this volume cover methods for removal of particle contaminants on surfaces. Several of

these methods are well established and have been employed in industrial applications for a long time. However, the ever- higher demand for removal of smaller particles on newer substrate materials is driving continuous development of the established cleaning

methods and alternative innovative methods for particle removal. This book provides information on the latest developments in this topic area. Comprehensive coverage of innovations in surface contamination and cleaning Written by

established experts in the contamination and cleaning field Each chapter is a comprehensive review of the state of the art Case studies included Developments in Surface Contamination and Cleaning: Types of Contamination and Contamination

Resources

Proceedings of the Symposium on Contamination Control and Defect Reduction in Semiconductor Manufacturing III

October 15, 1996, SEMICON® Southwest 96, Austin Convention Center, Austin, Texas

Analytical and

Diagnostic Techniques for Semiconductor Materials, Devices and Processes

Developments in Surface Contamination and Cleaning, Volume 7

Contamination Control for Semiconductor, FPD, and Suppliers

This book

develops foresight techniques to turn future societal challenges into opportunities. The authors present foresight approaches for innovation policy and

management. Future developments in fields such as education, energy, new materials, nano technologies are highlighted for different countries. Readers will discover tools

and instruments to capture the potentials of the grand societal challenges as defined by the United Nations. This book is a valuable resource for researchers and

scholars with an interest in foresight methods and gives practical hints for policy makers and managers to take account of the grand opportunities in their business and policy

strategies. A practical "how to" guide that effectively deals with the control of both contamination and ESD This book offers effective strategies and techniques for contamination

and electrostatic discharge (ESD) control that can be implemented in a wide range of high-technology industries, including semiconductor, disk drive, aerospace,

pharmaceutical, medical device, automobile, and food production manufacturing. The authors set forth a new and innovative methodology that can manage both contamination and ESD, often

considered to be mutually exclusive challenges requiring distinct strategies. Beginning with two general chapters on the fundamentals of contamination and ESD

control, the book presents a logical progression of topics that collectively build the necessary skills and knowledge: Analysis methods for solving contamination

and ESD problems Building the contamination and ESD control environment, including design and construction of cleanrooms and ESD protected environments

Cleaning processes and the equipment needed to support these processes

Tooling design and certification

Continuous monitoring

Consumable supplies and

packaging materials Controlling contamination and ESD originating from people Management of cleanrooms and ESD protected workplace environments Contamination

and ESD Control in High-Technology Manufacturing conveys a practical, working knowledge of contamination and ESD control strategies and techniques, and

it is filled with case studies that illustrate key principles and the benefits of contamination and ESD control. Moreover, its straightforward style makes the material, which

integrates many disciplines of engineering and science, clear and accessible. Written by three leading industry experts, this book is an essential guide for engineers

and designers across the many industries where contamination and ESD control is a concern.

As a companion to books on proj ect-management theory, this

book illustrates, in a down-to-earth, comprehensive style, how to put that theory into practice. In addition to the many examples that illustrate procedures, the book includes over 25 case

studies, each one addressing a specific theme. Key topics, such as project selection, negotiations, planning and scheduling, cost and budgeting, project control, human

resources, environmental impacts, risk management, and financial evaluation, are discussed, using a step-by-step approach. Beginning at the grassroots level, some cases are solved

by hand to illustrate the mechanics of a procedure, while others are solved using advanced computer programs. In this way the reader has a clear idea of the problem, how

and when to raise the issue, information needed (and who can provide it), how to solve it by hand, when possible, and also its resolution using the latest informatics tools.

Handbook of Semiconductor Manufacturing Technology
Cleaning Technology in Semiconductor Device Manufacturing VIII
Cleaning Technology in Semiconductor

Device Manufacturing Fundamentals and Applications

Methods for Removal of Particle Contaminants Semiconductor Manufacturing Handbook

This textbook

covers all the steps in manufacturing a biomedical product from bench to bedside. It specifically focuses on quality assurance and management and explains the different good

practice principles in the various phases of product development as well as how to fulfill them: Good laboratory practice, good manufacturing practice and good clinical

practice. It provides readers with the know-how to design biomedical experiments to ensure quality and integrity, to plan and conduct standard preclinical studies and to

assure the quality of the final manufactured biomedical products. Importantly, it also addresses ethical concerns and considerations. The book discusses the

guidelines and ethical considerations for preclinical and clinical studies, to allow readers to identify safety concerns regarding biomedical products and to

improve pre-clinical studies for the development of better products. This textbook is a valuable guide for biomedical students (B.Sc., M.S., and Ph.D. students) in the field of molecular

medicine, medical biotechnology, stem cell research and related areas, as well as for professionals such as quality control staff, tissue bankers, policy-makers

and health professionals. Developments in Surface Contamination and Cleaning, Volume Ten, provides a state-of-the-art guide to the current knowledge on the behavior of film-

type and particulate surface contaminants and their cleaning methods. This newest volume in the series discusses mechanisms of particle adhesion,

particle behavior in liquid systems, and metallic contamination and its impact. In addition, the book includes a discussion of the types of contaminants, with resources to deal with them

and information on environmental issues related to surface contamination and cleaning. Taken as a whole, the series forms a unique reference for professionals and academics

working in the area of surface contamination and cleaning that also includes information on cleaning at the micro and nano scales. Written by established experts in the contamination

field that provide an authoritative resource Presents a comprehensive review of new trends in contaminants and resources for dealing with those contaminants

Contains detailed case studies to illustrate various scenarios This comprehensive volume provides an in-depth discussion of the fundamentals of cleaning and surface

conditioning of semiconductor applications such as high-k/metal gate cleaning, copper/low-k cleaning, high dose implant stripping, and silicon and SiGe passivation. The theory and

fundamental physics associated with wet etching and wet cleaning is reviewed, plus the surface and colloidal aspects of wet processing. Formulation development

practices and methodology are presented along with the applications for preventing copper corrosion, cleaning aluminum lines, and other sensitive layers. This is a must-

have reference for any engineer or manager associated with using or supplying cleaning and contamination free technologies for semiconductor manufacturing.

From the Reviews... "This handbook will be a valuable resource for many academic libraries. Many engineering librarians who work with a variety of programs

(including, but not limited to Materials Engineering) should include this work in their collection. My recommendation is to add this work to any collection that serves a campus

with a materials/ manufacturing/el ectrical/computer engineering programs and campuses with departments of physics and/or chemistry with large graduate-level enrollment." —Randy Wallace,

Department Head, Discovery Park Library, University of North Texas

Creating Opportunities Through Public Policies and Corporate Strategies in Science,

Technology and Innovation
Flat Panel Displays in Perspective
Remediation Case Studies
Fundamentals of Semiconductor Manufacturing and Process Control

Project Management for Environmental, Construction and Manufacturing Engineers

Contaminant Removal and Monitoring

A practical guide to semiconductor

manufacturing from processcontrol to yield modeling and experimental design Fundamentals of Semiconductor Manufacturing and Process Controlcovers all issues

involved in manufacturing microelectronic devicesand circuits, including fabrication sequences, process control ,experimental design, process modeling, yield modeling, and

CIM/CAMsystems. Readers are introduced to both the theory and practice ofall basic manufacturing concepts. Following an overview of manufacturing and technology, the

textexplores process monitoring methods, including those that focus onproduct wafers and those that focus on the equipment used toproduce wafers. Next,

the text sets forth some fundamentals ofstatistics and yield modeling, which set the foundation for adetailed discussion of how statistical process control is used

toanalyze quality and improve yields. The discussion of statistical experimental design offers readers apowerful approach for systematically varying controllable pr

ocessconditions and determining their impact on output parameters thatmeasure quality. The authors introduce process modeling concep ts,including several

advanced process control topics such asrun-by-run, supervisory control, and process and equ ipmentdiagnosis . Critical coverage includes the following: * Combines

process control and semiconductor manufacturing * Unique treatment of system and software technology and managementof overall manufacturing systems *

Chapters include case studies, sample problems, and suggestedexercises * Instructor support includes electronic copies of the figures andan instructor's manual Graduate-

level students and industrial practitioners will benefitfrom the detailed exami?nation of how electronic materials andsupplies are converted into finished integrated

circuits andelectronic products in a high-volume man ufacturingenvir onment. An Instructor's Manual presenting detailed solutions to all theproblems in the book is

available from the Wiley editorialdepartment. An Instructor Support FTP site is also available. Issues in Electronic Circuits, Devices, and Materials: 2011 Edition is a Sc

holarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Electronic Circuits, Devices, and Materials. The

editors have built Issues in Electronic Circuits, Devices, and Materials: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information

about Electronic Circuits, Devices, and Materials in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative,

informed, and relevant. The content of Issues in Electronic Circuits, Devices, and Materials: 2011 Edition has been produced by the world's leading scientists,

engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the

editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is

available at http://www.ScholarlyEditions.com/.

Understand the design, testing, and application of cleanroom robotics and automation with this practical guide. From the

history and evolution of cleanroom automation to the latest applications and industry standards, this book provides the only complete overview of the topic

available. With over 20 years' industry experience in robotics design, Karl Mathia provides numerous real-world examples to enable you to learn from professional experience,

maximize the design quality and avoid expensive design pitfalls. You'll also get design guidelines and hands-on tips for reducing design time and cost.

Compliance with industry and de-facto standards for design, assembly, and handling is stressed throughout, and detailed discussions of recommended materials for atmospheric and

vacuum robots are included to help shorten product development cycles and avoid expensive material testing. This book is the perfect practical reference for

engineers working with robotics for electronics manufacturing in a range of industries that rely on cleanroom manufacturing. Series on Emission Scenario

Documents Photoresist Use in Semiconductor Manufacturing Analytical and Diagnostic Techniques for Semiconductor Materials, Devices, and Processes Particle

Control for Semiconductor Manufacturing Biomedical Product Development: Bench to Bedside Emerging Contaminants Cleanliness Validation and Verification

In this series Rajiv Kohli and Kash Mittal have brought together the work of experts from different industry sectors and backgrounds to provide a state-of-the-art survey and best-practice guidance for scientists and engineers engaged in surface cleaning or handling the

consequences of surface contamination. The expert contributions in this volume cover important fundamental aspects of surface contamination that are key to understanding the behavior of specific types of contaminants. This understanding is essential to develop

preventative and mitigation methods for contamination control. The coverage complements the treatment of surface contamination in vol.1, Fundamental and Applied Aspects. This volume covers: Sources and Generation of Particles; Manipulation

Techniques for Particles on Surfaces; Particle Deposition and Rebound; Particle Behavior in Liquid Systems; Biological and Metallic Contamination; and includes a comprehensive list of current standards and resources. Feature: Comprehensive coverage of

innovations in surface contamination and cleaning Benefit: One-stop series where a wide range of readers will be sure to find a solution to their cleaning problem, saving the time involved in consulting a range of disparate sources. Feature: Written by established experts in the

contamination and cleaning field Benefit: Provides an authoritative resource Feature: Each chapter is a comprehensive review of the state of the art. Benefit: Can be relied on to provide insight, clarity and real expertise on up-to-the-minute innovations. Feature: Case studies included

Benefit: Case studies help the reader see theory applied to the solution of real-world practical cleaning and contamination problems.

."... ALTECH 2003 was Symposium J1 held at the 203rd Meeting of the Electrochemical Society in Paris, France from April 27 to May 2, 2003 ...

Symposium M1, Diagnostic Techniques for Semiconductor Materials and Devices, was part of the 202nd Meeting of the Electrochemical Society held in Salt Lake City, Utah, from October 21 to 25, 2002 ..."--p. iii.

Retaining the comprehensive and in-depth approach that

cemented the bestselling first edition's place as a standard reference in the field, the Handbook of Semiconductor Manufacturing Technology, Second Edition features new and updated material that keeps it at the vanguard of today's most dynamic and

rapidly growing field. Iconic experts Robert Doering and Yoshio Nishi have again assembled a team of the world's leading specialists in every area of semiconductor manufacturing to provide the most reliable, authoritative, and industry-leading information available. Stay Current with the

Latest Technologies In addition to updates to nearly every existing chapter, this edition features five entirely new contributions on... Silicon-on-insulator (SOI) materials and devices Supercritical CO2 in semiconductor cleaning Low-? dielectrics Atomic-layer deposition Damascene copper

electroplating Effects of terrestrial radiation on integrated circuits (ICs) Reflecting rapid progress in many areas, several chapters were heavily revised and updated, and in some cases, rewritten to reflect rapid advances in such areas as interconnect technologies, gate dielectrics, photomask

fabrication, IC packaging, and 300 mm wafer fabrication. While no book can be up-to-the-minute with the advances in the semiconductor field, the Handbook of Semiconductor Manufacturing Technology keeps the most important data, methods, tools, and techniques close at

hand.

Joint Proceedings of Symposia On: ALTEC 2003 : Analytical Techniques for Semiconductor Materials and Process Characterization IV : Paris, France ; and the 202nd Meeting of the Electrochemical Society : Diagnostic Techniques for Semiconductor

Materials and Devices VI : Salt Lake City, Utah

Deploying Foresight for Policy and Strategy Makers

MM & T Program to Establish Production Techniques for the Automatic Detection and Qualification of Trace Elements Present in the Production of

Microwave Semiconductors
Crystalline Defects and Contamination
Joint Proceedings of the Symposia on ALTECH 99, Satellite Symposium to ESSDERC 99, Leuven, Belgium [and] the Electrochemical Society Symposium on Diagnostic Techniques for Semiconductor

Materials and Devices

Contamination-free Manufacturing (CFM) and Control for Semiconductor Manufacturing

When industry try to train and utilize mic ro-contamination control engineers for

its own industrial purpose, most of candidates for micro-contamination control engineering are college graduates from science and engineering majors that we

have mentioned above section. Those fresh micro-contamination control engineers may not have experienced more than own majored field. Thus it is necessary to

secure diversity for training micro-contamination control engineers from various science and engineering background. To achieve this goal, we need an experienced leader who has

rich convergence knowledge and experience in various science and engineering area. To find a right trainer is the good starting point to build a successful micr o-contamination

control team. Most industry are betting their luck for their business on major functioning teams such as research & development team, manufacturing team and

equipment development team and etc. It is true that core technology teams to produce a new product are such a conventional major areas such as I mentioned

above. And the new product is preparing by those teams with lots of budget and significant numbers of people for years. However to make a reasonable profit through

the mass production of new product is critically depend on micro-contamination control technology for the high valued products such as semiconductors and OLEDs. I

believe that a few people in Korea can feel it and believe it. This fact is the secrete why Korea can be the number one in mass production of semiconductor and AMOLED.Japanese

display industry started R & D of OLED much earlier than Korean display industry, but Japanese display industry could not success mass production of OLED. One of

the Japanese display industry personnel told that climbing Fuji Mountain by hand-standing is easier than success of OLED mass production by Korean display

industry. Eventually, Samsung SDI AMOLED Division has succeeded the world first OLED mass production and has been keeping leading position on mobile OLED business since

2006.It might be sound odd, as a Micro-Contamination Control engineer and Micro-Contamination Control team leader was related to the first success of OLED mass

production. My opinion, that the success of Samsung SDI is partially due to the Micro-Contamination Control technology team work that enabled to build secure mass production

process environment for OLED and to sustain the critical process environment conditions silently without proper recognition nor reward. Again, this story

might be seemed to strange and sad. But it is true as long as I and my team members have been working earnestly and honestly in OLED mass production environment for past eleven

years supporting the world number one OLED Company to keep its title so far. My small wish is that some insightful CEO or top level manager will recognize the value of Mi

cro-Contamination Control Technology and the humble contribution of Micro-Contamination Control engineers. I believe that investing Micro-Contamination

Control will be one of the best rewarding investment in IT industry and other industry that produce and sale high value and high quality products. Emerging Contaminants

presents the reader with information on classification, recent studies, and adverse effects on the environment and human health of the main classes of contaminants. Emerging

contaminants are synthetic or natural compounds and microorganisms produced and used by humans that cause adverse ecological and human health effects when they reach the

environment. This book is organized into four sections that cover the classification of contaminants and the instrumental techniques used to quantify them, recent studies on

pesticides, antibiotics as an important group of emerging contaminants, and studies of different classes of emerging contaminants such as polybrominated

diphenyl ethers (PBDEs), microplastics, and others. This OECD Emission Scenario Document (ESD) provides information on the sources, use patterns, and potential

release pathways of chemicals used in the semiconductor manufacturing industry.

Soil Vapor Extraction

Their Impact and Control in Device Manufacturing :

Proceedings of the Satellite Symposium to ESSDERC 93, Grenoble, France

Proceedings of the Sixth International Symposium

Their Impact and Control in Device

Manufacturing IV, DECON 2005 : Proceedings of the Satellite Symposium to ESSDERC 2005, Grenoble, France

Methods of Cleaning and Cleanliness Verification

Proceedings of the Symposium on Contamination Control and Defect Reduction in Semiconductor Manufacturing I