

# SEM Hitachi S-4700 user manual

English Version by Eric, VDEC, Mita Lab, 2015/01/27

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<http://takeda-cr.t.u-tokyo.ac.jp> (accessible only from inside U Tokyo)

## 1. Warnings and recommendations

Be sure to read the following remarks:

- 1.1. This equipment belongs to VAN Partners. Let's handle it with much care.
- 1.2. Before exchanging the sample, always check that the stage is in its initial position:  
 $X = Y = 12.5\text{mm}$ ,  $Z = 12\text{mm}$ , Tilt =  $0^\circ$ ,  $\theta = 0^\circ$
- 1.3. This is a simplified manual. It is recommended to read and study the original manual.

## 2. Terms

- 2.1. RP = Rotary Pump,
- 2.2. IP = Ion Pump,
- 2.3. DP = oil Diffusion Pump,
- 2.4. S.C. = Specimen Chamber = main chamber,
- 2.5. S.E.C. = Specimen Exchange Chamber = Load lock chamber.

## 3. Regular State

Always ON. RP and DP maintain vacuum in the main chamber and IP maintain vacuum in the column.

## 4. Points to check before starting

If there is an abnormality, contact the person in charge.

On the front panel (below the S.C.), check from left to right:

- 4.1. EVAC POWER
  - 4.1.1. Switch is ON,
  - 4.1.2. DP/TMP, WATER and AIR PRES switched ON (green lamps ON)
- 4.2. OBJ. APT. → position HEAT
- 4.3. ION PUMP VACUUM
  - 4.3.1. Lamps IP1, IP2, and IP3 lighted ON,
  - 4.3.2. Check the IPs vacuum values by rotating the knob. The following should be satisfied:  
 $IP1 < 2e-7\text{Pa}$ ,  $IP2 < 2e-6\text{Pa}$ ,  $IP3 < 7e-5\text{Pa}$ . Fill out the log with the values.
- 4.4. CHAMBER VACUUM → S.C and S.E.C vacuum are HIGH (green lamps)
- 4.5. VALVE → GUN switch in position CLOSE. If not, set it to CLOSE
- 4.6. CHAMBER → switch on S.E.C. (should be protected with a tape)
- 4.7. If you want to use the cold trap, check that there is more than 1.3L of liquid nitrogen in the Dewar Vessel. If this is not the case, fetch some nitrogen in CR2.

## 5. Preparation

- 5.1. Turn PC on
  - 5.1.1. DISPLAY switch ON (under the PC desk, behind the door),
  - 5.1.2. Windows 95 will startup.
  - 5.1.3. Press CTRL+ALT+DEL.
  - 5.1.4. Launch PC-SEM.exe. There is no password, just click OK,
  - 5.1.5. When the soft start, a dialog showing the X and Y values of the stage appears. Check the real values of X and Y, enter those values in the box and then click OK,
- 5.2. Filling liquid nitrogen  
If you want to use the cold trap, fill it with 1.3L of liquid nitrogen.
- 5.3. Set the sample
  - 5.3.1. Select a suitable sample holder,

# Hitachi Manual Sem

**Yafang Han**



## **Hitachi Manual Sem:**

*A Practical Guide to Scanning Electron Microscopy in the Biosciences* Gerhard Wanner, 2022-09-13 A concise and authoritative introduction to scanning electron microscopy in the biological sciences In *A Practical Guide to Scanning Electron Microscopy* distinguished electron microscopist Gerhard Wanner delivers a practical handbook for biological scientists working with microbial plant and animal cells and tissues enabling them to successfully apply scanning electron microscopy SEM to their object of study The book begins with an introduction to the principles of electron microscopy and the operation of electron microscopes before moving on to describe the preparation and mounting of specimens It also explores the process of recoding images and their subsequent analysis along with a wide range of advanced microscopy techniques including cryo SEM FIB SEM tomography and stereo SEM *Scanning Electron Microscopy in the Biosciences* contains hundreds of carefully selected microscopic images as well as hands on step by step guidance required to perform a successful TEM experiment Readers will also find Thorough introductions to optics electron microscopy electrons and the components of electron microscopes In depth examinations of the preparation of biological specimens and specimen mounting for scanning electron microscopy A comparison of different SEM modes and their strengths and weaknesses An introduction to novel techniques such as correlative light and electron microscopy CLEM array tomography and cryo scanning electron microscopy Perfect for cell biologists and microbiologists *A Practical Guide to Scanning Electron Microscopy in the Biosciences* also belongs in the libraries of neurobiologists and biophysicists

*A Beginners' Guide to Scanning Electron Microscopy* Anwar Ul-Hamid, 2018-10-26 This book was developed with the goal of providing an easily understood text for those users of the scanning electron microscope SEM who have little or no background in the area The SEM is routinely used to study the surface structure and chemistry of a wide range of biological and synthetic materials at the micrometer to nanometer scale Ease of use typically facile sample preparation and straightforward image interpretation combined with high resolution high depth of field and the ability to undertake microchemical and crystallographic analysis has made scanning electron microscopy one of the most powerful and versatile techniques for characterization today Indeed the SEM is a vital tool for the characterization of nanostructured materials and the development of nanotechnology However its wide use by professionals with diverse technical backgrounds including life science materials science engineering forensics mineralogy etc and in various sectors of government industry and academia emphasizes the need for an introductory text providing the basics of effective SEM imaging *A Beginners Guide to Scanning Electron Microscopy* explains instrumentation operation image interpretation and sample preparation in a wide ranging yet succinct and practical text treating the essential theory of specimen beam interaction and image formation in a manner that can be effortlessly comprehended by the novice SEM user This book provides a concise and accessible introduction to the essentials of SEM includes a large number of illustrations specifically chosen to aid readers understanding of key concepts highlights recent

advances in instrumentation imaging and sample preparation techniques offers examples drawn from a variety of applications that appeal to professionals from diverse backgrounds      Ultra-Clean Technology Handbook Ohmi,1993-06-29 Evaluating the effectiveness of conventional wet processes for cleaning silicon wafers in semiconductor production this reference reveals concrete measures to improve ultrapure water quality reviewing the structure and physical characteristics of ultrapure water molecules The volume is divided into      **Handbook of Clay Science** ,2013-07-23 The first edition of the Handbook of Clay Science published in 2006 assembled the scattered literature on the varied and diverse aspects that make up the discipline of clay science The topics covered range from the fundamental structures including textures and properties of clays and clay minerals through their environmental health and industrial applications to their analysis and characterization by modern instrumental techniques Also included are the clay microbe interaction layered double hydroxides zeolites cement hydrates and genesis of clay minerals as well as the history and teaching of clay science The 2e adds new information from the intervening 6 years and adds some important subjects to make this the most comprehensive and wide ranging coverage of clay science in one source in the English language Provides up to date comprehensive information in a single source Covers applications of clays as well as the instrumental analytical techniques Provides a truly multidisciplinary approach to clay science      *Practical Guide to Hot-Melt Extrusion* Mohammed Maniruzzaman,2015-07-22 Over the past few decades hot melt extrusion HME techniques have been shown to exhibit remarkable potential for the manufacture of various pharmaceutical products HME is an emerging processing technology used primarily for the manufacture of pharmaceutical solid dispersions combining the advantages of a solvent free process with fewer production steps making it suitable for easy to scale up and continuous manufacturing applications A single unit HME based operation employing heat and mechanical shear has displayed a significant potential to retain the stability even of thermo labile therapeutics e g proteins HME has now explicitly been established from a quality by design viewpoint for in line data monitoring as per the recent guidelines issued by the US Food and Drugs Administration FDA This book will focus primarily on the foregoing subject areas and will be of significant interest to a broad interdisciplinary readership across the industries and academia for but not limited to the following reasons Emerging HME processes and applications for multiple drug delivery Solid state engineering solubility enhancement controlled release taste masking and sustained release case studies from a continuous manufacturing view point Means to explore the potential of continuous manufacture of co crystals for promoting solvent free production methods Scale up case study and issue considerations and studies on the regulatory guidelines FDA for continuous manufacturing involving emerging HME techniques      Practical Guide to Materials Characterization Khalid Sultan,2022-09-13 Practical Guide to Materials Characterization Practice oriented resource providing a hands on overview of the most relevant materials characterization techniques in chemistry physics engineering and more Practical Guide to Materials Characterization focuses on the most widely used experimental approaches for

structural morphological and spectroscopic characterization of materials providing background insights on the correct usage of the respective techniques and the interpretation of the results With a focus on practical applications the work illustrates what to use and when including real life examples showing which characterization techniques are best suited for particular purposes Furthermore the work covers the practical elements of the analytical techniques used to characterize a wide range of functional materials both in bulk as well as thin film form in a simple but thorough manner To aid in reader comprehension Practical Guide to Materials Characterization is divided into eight distinct chapters To set the stage the first chapter of the book reviews the fundamentals of materials characterization that are necessary to understand and use the methods presented in the ensuing chapters Among the techniques covered are X ray diffraction Raman spectroscopy X ray spectroscopy electron microscopies magnetic measurement techniques infrared spectroscopy and dielectric measurements Specific sample topics covered in the remaining seven chapters include Bragg s Law the Von Laue Treatment Laue s Equation the Rotating Crystal Method the Powder Method orientation of single crystals and structure of polycrystalline aggregates Classical theory of Raman scattering quantum theory of Raman spectroscopy high pressure Raman spectroscopy and surface enhanced Raman spectroscopy Basic principles of XAS energy referencing XPS spectra and its features Auger Electron Spectroscopy AES and interaction of electrons with matter Magnetization measuring instruments the SQUID magnetometer and the advantages and disadvantages of vibrating sample magnetometer VSM With comprehensive and in depth coverage of the subject Practical Guide to Materials Characterization is a key resource for practicing professionals who wish to better understand key concepts in the field and seamlessly harness them in a myriad of applications across many different industries

**Prospects and Applications for Plant-Associated Microbes, A laboratory manual** Seppo

Sorvari, Anna Maria Pirttilä, 2014-12-15 Research on the microbial colonization of the aerial and subterranean tissues of plants has shown an extensive scale of interactions between the hosts and a range of microbes including bacteria and fungi Intercellular spaces vascular systems and even single cells can be inhabited by these endophytic microbes Of the bacterial endophytes only a small percentage is harmful to the plant most are neutral opportunistic or beneficial These plant based bacteria can have various important functions throughout the life cycle of the plant some promote plant growth and development others protect the plant from diseases This ability to be able to protect plants from diseases has catalyzed numerous laboratories to search for new bacteria that could be utilized instead of the traditional plant protective agents Because two or more interacting organisms are involved research and the eventual application of suitable bio controlling microbes are challenging and often require specific skills and equipment The purpose of this book is to provide a comprehensive review for those who are interested in the research and biotechnological applications of plant associated bacteria It also provides a compilation of current work conducted on plant bacteria interactions

**Nanofabrication** Zheng Cui, 2016-08-10 This second edition of Nanofabrication is one of the most comprehensive introductions on nanofabrication

technologies and processes A practical guide and reference this book introduces readers to all of the developed technologies that are capable of making structures below 100nm The principle of each technology is introduced and illustrated with minimum mathematics involved Also analyzed are the capabilities of each technology in making sub 100nm structures and the limits of preventing a technology from going further down the dimensional scale This book provides readers with a toolkit that will help with any of their nanofabrication challenges *Integrated Circuit Metrology, Inspection, and Process Control*

,1995 **Recent Advances in Technology Research and Education** Yukinori Ono,Jun Kondoh,2024-02-29 This book presents the 20th edition of the Inter Academia Conference which aims to be a valuable resource for academic institutions in search for novel approaches for a global education for industry partners exploring new fundamental research ideas for government bodies seeking international projects that promote sustainable growth and most certainly for the global scientific community more and more invested in the multi disciplinarity of modern research Interdisciplinary research collaboration is crucial for solving many pressing issues and challenges facing society today Bringing together researchers and educators from different disciplines allows a more holistic understanding of complex problems providing also the opportunity for new learning and for collaboration on complex projects Beyond its scientific merits and value Inter Academia also promotes a culture of intellectual diversity innovative thinking and global perspective that can foster breakthrough discoveries unexpected advancements in research and last but not least a sense of belonging to a global community Being established in 2002 the Inter Academia Community currently gathers researchers from 14 leading Universities in Eastern and Central Europe together with Shizuoka University in Japan As such the Inter Academia Community serves as a strong bond across continents allowing the development of a number of global projects for student and researcher mobility with a significant impact on the broader scientific community The peer reviewed papers included in this book hopefully stimulate further interactions and collaborations covering both fundamental and applied research with benefits for the global society Veja

,1992 Computational Modelling of Concrete Structures Günther Meschke,Bernhard Pichler,Jan G. Rots,2018-01-31 The EURO C conference series Split 1984 Zell am See 1990 Innsbruck 1994 Badgastein 1998 St Johann im Pongau 2003 Mayrhofen 2006 Schladming 2010 St Anton am Arlberg 2014 and Bad Hofgastein 2018 brings together researchers and practising engineers concerned with theoretical algorithmic and validation aspects associated with computational simulations of concrete and concrete structures Computational Modelling of Concrete Structures reviews and discusses research advancements and the applicability and robustness of methods and models for reliable analysis of complex concrete reinforced concrete and pre stressed concrete structures in engineering practice The contributions cover both computational mechanics and computational modelling aspects of the analysis and design of concrete and concrete structures Multi scale cement and concrete research experiments and modelling Aging concrete from very early ages to decades long durability Advances in material modelling of plain concrete Analysis of reinforced concrete structures Steel concrete interaction fibre

reinforced concrete and masonry Dynamic behaviour from seismic retrofit to impact simulation Computational Modelling of Concrete Structures is of special interest to academics and researchers in computational concrete mechanics as well as industry experts in complex nonlinear simulations of concrete structures Advanced Functional Materials Yafang Han, 2018-04-19 This proceedings volume gathers selected papers presented at the Chinese Materials Conference 2017 CMC2017 held in Yinchuan City Ningxia China on July 06 12 2017 This book covers a wide range of metamaterials and multifunctional composites multiferroic materials amorphous and high entropy alloys advanced glass materials and devices advanced optoelectronic and microelectronic materials biomaterials deformation behavior and flow units in metastable materials advanced fibers and nano composites polymer materials and nanoporous metal materials The Chinese Materials Conference CMC is the most important serial conference of the Chinese Materials Research Society C MRS and has been held each year since the early 1990s The 2017 installment included 37 Symposia covering four fields Advances in energy and environmental materials High performance structural materials Fundamental research on materials and Advanced functional materials More than 5500 participants attended the congress and the organizers received more than 700 technical papers Based on the recommendations of symposium organizers and after peer reviewing 490 papers have been included in the present proceedings which showcase the latest original research results in the field of materials achieved by more than 300 research groups at various universities and research institutes **Istc/cstic 2009 (cistc)** David Huang, 2009-03 ISTC CSTIC is an annual semiconductor technology conference covering all the aspects of semiconductor technology and manufacturing including devices design lithography integration materials processes manufacturing as well as emerging semiconductor technologies and silicon material applications ISTC CSTIC 2009 was merged by ISTC International Semiconductor Technology Conference and CSTIC China Semiconductor Technology International Conference the two industry leading technical conferences in China and consisted of one plenary session and nine technical symposia This issue of ECS Transactions contains 159 papers from the conference Metrology, Inspection, and Process Control for Microlithography, 2000 *Materials for Ultra-Supercritical and Advanced Ultra-Supercritical Power Plants* Augusto Di Gianfrancesco, 2016-09-01 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

Phosphate Phosphors for Solid-State Lighting Kartik N. Shinde,S.J. Dhoble,H.C. Swart,Kyeongsoon Park,2012-12-15 The idea for this book arose out of the realization that although excellent surveys and a phosphor handbook are available there is no single source covering the area of phosphate based phosphors especially for lamp industry Moreover as this field gets only limited attention in most general books on luminescence there is a clear need for a book in which attention is specifically directed toward this rapidly growing field of solid state lighting and its many applications This book is aimed at providing a sound introduction to the synthesis and optical characterization of phosphate phosphor for undergraduate and graduate students as well as teachers and researchers The book provides guidance through the multidisciplinary field of solid state lighting specially phosphate phosphors for beginners scientists and engineers from universities research organizations and especially industry In order to make it useful for a wide audience both fundamentals and applications are discussed together

*Heart Replacement* Tetsuzo Akutsu,Hitoshi Koyanagi,2013-06-29 The 5th International Symposium on Artificial Heart and Assist Devices was held in Tokyo on January 26 27 1995 bringing together leading researchers and specialists from all over the world The proceedings of the symposium presents the newest ideas and approaches in the field and will be of special interest and relevance to all who are concerned with artificial organs cardiovascular surgery organ transplantation biomaterials and related disciplines Reflecting the content of the symposium the major topics in this volume include biocompatible material development clinical use of assist devices completely implantable devices and heart transplantation These are presented in the two main divisions of the book The first consists of eight lectures by leading researchers world renowned in the field of the artificial heart The second comprises more than 50 papers on such subjects as biomaterials research and development of ventricular assist systems and the total artificial heart and their use as a bridge to heart transplantation An additional special feature of the book is the inclusion of descriptions of exhibitions at the symposium with photographs of all artificial heart devices and systems displayed by major laboratories and companies from around the world

Antifungal and Antiparasitic Drug Delivery Juan José Torrado Durán,Dolores R. Serrano,Javier Capilla,2020-07-01 Fungal and parasitic diseases affect more than one billion people across the globe This is one sixth of the world s population mostly located in developing countries The lack of effective and safe treatments combined with inefficient diagnosis leads to serious chronic illness or even death There is a discrepancy between the rate of drug resistance and the development of new medicines Formulation of



antifungal and antiparasitic drugs adapted to different administration routes is challenging bearing in mind the poor water solubility that limits their bioavailability and efficacy There is an unmet clinical need to develop vaccines novel formulations and drug delivery strategies that can improve the bioavailability and therapeutic effects by enhancing their dissolution increasing their chemical potency stabilizing the drug and targeting high concentrations of the drug to infection sites This Special Issue includes ten research articles of antifungal and antiparasitic drug delivery systems *Surface Chemistry and Catalysis* Michalis Konsolakis, 2018-09-27 This book is a printed edition of the Special Issue Surface Chemistry and Catalysis that was published in Catalysts

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