

SUPERCRITICAL FLUID CLEANING

Fundamentals, Technology and Applications



Edited by
John W. Wardle and Thomas R. Farnham

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Supercritical Fluid Cleaning Fundamentals Technology And Applications

Ya-Ping Sun



Supercritical Fluid Cleaning Fundamentals Technology And Applications:

Supercritical Fluid Cleaning Samuel P. Sawan, 1998-12-31 Although supercritical fluid SCF technology is now widely used in extraction and purification processes in the petrochemical food and pharmaceuticals industries this book is the first to address the new application of cleaning The objective is to provide a roadmap for readers who want to know whether SCF technology can meet their own processing and cleaning needs It is particularly helpful to those striving to balance the requirements for a clean product and a clean environment The interdisciplinary subject matter will appeal to scientists and engineers in all specialties ranging from materials and polymer sciences to chemistry and physics It is also useful to those developing new processes for other applications and references given at the end of each chapter provide links to the wider body of SCF literature The book is organized with topics progressing from the fundamental nature of the supercritical state through process conditions and materials interactions to economic considerations Practical examples are included to show how the technology has been successfully applied The first four chapters consider principles governing SCF processing detailing issues such as solubility design for cleanability and the dynamics of particle removal The next three chapters discuss surfactants and microemulsions SCF interaction with polymers and the use of supercritical carbon dioxide CO₂ as a cleaning solvent The closing chapters focus on more practical considerations such as scaleup equipment costs and financial analysis

Supercritical Fluids: Innovations and Applications Siti Machmudah, Wahyudiono, Hideki Kanda, Motonobu Goto, 2024-06-02 This book explores the range and the utility of supercritical fluid system in a variety of diverse chemical applications The book highlighted the green process and served the necessary background and details about separation material processing and reaction regarding technique mechanism protocol and potential applications hence it can appeal to academics and industrialists Both from a chemical as well as engineering scene the book updates the recent advances in supercritical fluid technology and other pressurized solvent system subcritical water technology The most wide spread use of supercritical CO₂ as a solvent has been in supercritical fluid extraction and fractionation processes Other applications are recrystallization of pharmaceuticals metal nanoparticles generation and polymer processing Sub or supercritical water is a unique green solvent which can serve a high solubility for many weakly polar organics and light inorganic gases This solvent denotes very high reactivity for biomass processing

Developments in Surface Contamination and Cleaning: Applications of Cleaning Techniques Rajiv Kohli, K.L. Mittal, 2018-11-27 Developments in Surface Contamination and Cleaning Applications of Cleaning Techniques Volume Eleven part of the Developments in Surface Contamination and Cleaning series provides a guide to recent advances in the application of cleaning techniques for the removal of surface contamination in various industries such as aerospace automotive biomedical defense energy manufacturing microelectronics optics and xerography The material in this new edition compiles cleaning applications into one easy reference that has been fully updated to incorporate new applications and techniques Taken as a whole the series forms a unique reference for

professionals and academics working in the area of surface contamination and cleaning Presents the latest reviewed technical information on precision cleaning applications as written by established experts in the field Provides a single source on the applications of innovative precision cleaning techniques for a wide variety of industries Serves as a guide to the selection of precision cleaning techniques for specific applications **Handbook of Semiconductor Manufacturing Technology**

Yoshio Nishi,Robert Doering,2017-12-19 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 Developments in Surface Contamination and Cleaning - Vol 5 Rajiv

Kohli,Kashmiri L. Mittal,2012-12-31 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 dealing with the consequences of surface contamination This volume complements Volumes 3 and 4 of this series which focused largely on particulate contaminants The expert contributions in this volume cover methods for removal of non particulate contaminants such as metallic and non metallic thin films hydrocarbons toxic and hazardous chemicals and microbiological substances as well as contamination monitoring in pharmaceutical manufacturing and an innovative method for characterization at the nanoscale 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 **Handbook of Silicon Wafer Cleaning Technology**

Karen Reinhardt,Werner Kern,2008-12-10 The second Edition of the Handbook of Silicon Wafer Cleaning Technology is intended to provide knowledge of wet plasma and other surface conditioning techniques used to manufacture integrated circuits The integration of the clean processes into the device manufacturing flow will be presented with respect to other manufacturing steps such as thermal implant etching and photolithography processes The Handbook discusses both wet and

plasma based cleaning technologies that are used for removing contamination particles residue and photoresist from wafer surfaces Both the process and the equipment are covered A review of the current cleaning technologies is included Also advanced cleaning technologies that are under investigation for next generation processing are covered including supercritical fluid laser and cryoaerosol cleaning techniques Additionally theoretical aspects of the cleaning technologies and how these processes affect the wafer is discussed such as device damage and surface roughening will be discussed The analysis of the wafers surface is outlined A discussion of the new materials and the changes required for the surface conditioning process used for manufacturing is also included Focused on silicon wafer cleaning techniques including wet plasma and other surface conditioning techniques used to manufacture integrated circuits As this book covers the major technologies for removing contaminants it is a reliable reference for anyone that manufactures integrated circuits or supplies the semiconductor and microelectronics industries Covers processes and equipment as well as new materials and changes required for the surface conditioning process Editors are two of the top names in the field and are both extensively published Discusses next generation processing techniques including supercritical fluid laser and cryoaerosol Particle Adhesion and Removal K. L. Mittal, Ravi Jaiswal, 2015-01-06 The book provides a comprehensive and easily accessible reference source covering all important aspects of particle adhesion and removal The core objective is to cover both fundamental and applied aspects of particle adhesion and removal with emphasis on recent developments Among the topics to be covered include 1 Fundamentals of surface forces in particle adhesion and removal 2 Mechanisms of particle adhesion and removal 3 Experimental methods e g AFM SFA SFM IFM etc to understand particle particle and particle substrate interactions 4 Mechanics of adhesion of micro and nanoscale particles 5 Various factors affecting particle adhesion to a variety of substrates 6 Surface modification techniques to modulate particle adhesion 7 Various cleaning methods both wet dry for particle removal 8 Relevance of particle adhesion in a host of technologies ranging from simple to ultra sophisticated

Green Sustainable Process for Chemical and Environmental Engineering and Science Inamuddin, Abdullah M. Asiri, Arun M. Isloor, 2019-10-30 Green Sustainable Processes for Chemical and Environmental Engineering and Science Supercritical Carbon Dioxide as Green Solvent provides an in depth review on the area of green processes for the industry focusing on the separation purification and extraction of medicinal biological and bioactive compounds utilizing supercritical carbon dioxide as a green solvent and their applications in pharmaceuticals polymers leather paper water filtration textiles and more Chapters explore polymerization polymer composite production polymer blending particle production microcellular foaming polymer processing using supercritical carbon dioxide and a method for the production of micro and nano scale particles using supercritical carbon dioxide that focuses on the pharmaceutical industry A brief introduction and limitations to the practical use of supercritical carbon dioxide as a reaction medium are also discussed as are the applications of supercritical carbon dioxide in the semiconductor processing industry for wafer processing and its advantages and obstacles Reviews

available green solvents for extraction separation purification and synthesis Outlines environmentally friendly chemical processes in many applications i e organic reactions metal recovery etc Includes numerous real industrial applications such as polymers pharmaceuticals leather paper water filtration textiles food oils and fats and more Gives detailed accounts of the application of supercritical CO₂ in polymer production and processing Provides a process for extraction separation and purification of compounds of biological medicinal importance Gives methods for nanoparticle production using supercritical carbon dioxide Provides a systematic discussion on the solubility of organic and organometallic compounds

Particles on Surfaces Five and Six Kashmiri Lal Mittal, 1999-09 This volume documents the Proceedings of the 5th and 6th Symposia on Particles on Surfaces Detection Adhesion and Removal held under the aegis of the Fine Particle Society in Chicago May 6 9 1996 and Dallas April 1 3 1998 respectively The technical programs clearly reflected an interest and need to ameliorate the existing methods and to devise new and more efficient ways to detect analyze and characterize particles on surfaces The removal of particles from a host of surfaces was especially highlighted the need to remove smaller and smaller particles was particularly underscored All manuscripts included in this volume were properly peer reviewed and all were revised before inclusion in this volume Thus this book is not a mere collection of unreviewed papers but represents information that has passed peer scrutiny Furthermore the authors of the 5th Symposium were asked to update the information So the information presented in this book should be as fresh and up to date as possible This volume is divided into two parts Part 1 General Papers and Part 2 Particle Adhesion and Removal The topics covered include high sensitivity rapid detection of particles detection of particles using evanescent wave scattering particles on the backside of wafers particle shedding from fluid handling components dynamics of particle adhesion particle dispersion aggregation precision cleaning and particle removal by surfactants supercritical fluids hydrodynamic forces high speed droplet impinging megasonic CO₂ blasting CO₂ snow argon aerosol lasers microcluster beams brush and chemical mechanical methods This volume offers bountiful information and represent a current commentary on the R D activity taking place in the area of particles on surfaces particularly particle removal from a variety of surfaces

Handbook for cleaning/decontamination of surfaces

Ingegard Johansson, P. Somasundaran, 2007-06-20 The focus of Handbook for Cleaning Decontamination of Surfaces lies on cleaning and decontamination of surfaces and solid matter hard as well as soft Bringing together in a 2 volume reference source current knowledge of the physico chemical fundamentals underlying the cleaning process the different needs for cleaning and how these needs are met by various types of cleaning processes and cleaning agents including novel approaches how to test that cleaning has taken place and to what extent the effects of cleaning on the environment future trends in cleaning and decontamination for example the idea of changing surfaces to hinder the absorbance of dirt and thus make cleaning easier A brief introduction is given to the legal demands concerning the environment and a historical background in terms of development of detergents from soaps to the modern sophisticated formulations Bactericides their

use and the environmental demands on them are covered Thorough discussions of mechanisms for cleaning are given in several chapters both general basic concepts and special cases like particle cleaning and cleaning using microemulsion concepts General understanding of how cleaning works function of ingredients and formulations Overview of environmental issues and demands from the society in the area Gives basic formulas for cleaning preparations in most areas

Advances in Biosensors: Reviews, Vol. 2 Sergey Yurish, 2018-10-08 The global biosensors industry is approaching towards multi billion market The modern biosensors market growth is driven by the continuous technological advancements in the biosensors ecosystem increase in the use of biosensors for nonmedical applications lucrative growth in point of care diagnostics and rise in the demand for glucose monitoring systems Increasing applications in diagnosis of various diseases and development of nanoparticle based electrochemical biosensors significantly stimulates growth of biosensors industry The second volume of Advances in Biosensors Reviews Book Series contains six chapters written by 24 authors from 7 countries Brazil China Denmark Japan South Africa Sweden and Ukraine

Solubility in Supercritical Carbon Dioxide Ram B. Gupta, Jae-Jin Shim, 2006-12-06 Supercritical fluid extraction is an environmentally safe and cost effective alternative to traditional organic solvents Carbon dioxide is widely used as the solvent of choice for applications such as caffeine and nicotine extraction due to its mild critical temperature nontoxicity nonflammability and low cost Introducing the most complete col

Microfluidics and Nanofluidics Handbook Sushanta K. Mitra, Suman Chakraborty, 2016-04-19 This comprehensive handbook presents fundamental aspects fabrication techniques introductory materials on microbiology and chemistry measurement techniques and applications of microfluidics and nanofluidics The second volume focuses on topics related to experimental and numerical methods It also covers fabrication and applications in a variety of areas from aerospace to biological systems Reflecting the inherent nature of microfluidics and nanofluidics the book includes as much interdisciplinary knowledge as possible It provides the fundamental science background for newcomers and advanced techniques and concepts for experienced researchers and professionals

Physico-chemical Aspects of Textile Coloration Stephen M. Burkinshaw, 2016-02-08 The production of textile materials comprises a very large and complex global industry that utilises a diverse range of fibre types and creates a variety of textile products As the great majority of such products are coloured predominantly using aqueous dyeing processes the coloration of textiles is a large scale global business in which complex procedures are used to apply different types of dye to the various types of textile material The development of such dyeing processes is the result of substantial research activity undertaken over many decades into the physico chemical aspects of dye adsorption and the establishment of dyeing theory which seeks to describe the mechanism by which dyes interact with textile fibres Physico Chemical Aspects of Textile Coloration provides a comprehensive treatment of the physical chemistry involved in the dyeing of the major types of natural man made and synthetic fibres with the principal types of dye The book covers fundamental aspects of the physical and chemical structure of both fibres and dyes together

with the structure and properties of water in relation to dyeing as an area of study as well as the terminology employed in dyeing technology and science contemporary views of intermolecular forces and the nature of the interactions that can occur between dyes and fibres at a molecular level fundamental principles involved in dyeing theory as represented by the thermodynamics and kinetics of dye sorption detailed accounts of the mechanism of dyeing that applies to cotton and other cellulosic fibres polyester polyamide wool polyacrylonitrile and silk fibres non aqueous dyeing as represented by the use of air organic solvents and supercritical CO₂ fluid as alternatives to water as application medium The up to date text is supported by a large number of tables figures and illustrations as well as footnotes and widespread use of references to published work The book is essential reading for students teachers researchers and professionals involved in textile coloration

Microfluidics and Nanofluidics Handbook, 2 Volume Set Sushanta K. Mitra, Suman Chakraborty, 2011-09-20 A comprehensive two volume handbook on Microfluidics and Nanofluidics this text covers fundamental aspects fabrication techniques introductory materials on microbiology and chemistry measurement techniques and applications with special emphasis on the energy sector Each chapter begins with introductory coverage to a subject and then narrows in on advanced techniques and concepts thus making it valuable to students and practitioners The author pays special attention to applications of microfluidics in the energy sector and provides insight into the world of opportunities nanotechnology has to offer Figures tables and equations to illustrate concepts

Publications Combined - Over 100 Studies In Nanotechnology With Medical, Military And Industrial Applications 2008-2017 , Over 7 300 total pages Just a sample of the contents Title Multifunctional Nanotechnology Research Descriptive Note Technical Report 01 Jan 2015 31 Jan 2016 Title Preparation of Solvent Dispersible Graphene and its Application to Nanocomposites Descriptive Note Technical Report Title Improvements To Micro Contact Performance And Reliability Descriptive Note Technical Report Title Delivery of Nanotethered Therapies to Brain Metastases of Primary Breast Cancer Using a Cellular Trojan Horse Descriptive Note Technical Report 15 Sep 2013 14 Sep 2016 Title Nanotechnology Based Detection of Novel microRNAs for Early Diagnosis of Prostate Cancer Descriptive Note Technical Report 15 Jul 2016 14 Jul 2017 Title A Federal Vision for Future Computing A Nanotechnology Inspired Grand Challenge Descriptive Note Technical Report Title Quantifying Nanoparticle Release from Nanotechnology Scientific Operating Procedure Series SOP C 3 Descriptive Note Technical Report Title Synthesis Characterization And Modeling Of Functionally Graded Multifunctional Hybrid Composites For Extreme Environments Descriptive Note Technical Report 15 Sep 2009 14 Mar 2015 Title Equilibrium Structures and Absorption Spectra for SixOy Molecular Clusters using Density Functional Theory Descriptive Note Technical Report Title Nanotechnology for the Solid Waste Reduction of Military Food Packaging Descriptive Note Technical Report 01 Apr 2008 01 Jan 2015 Title Magneto Electric Conversion of Optical Energy to Electricity Descriptive Note Final performance rept 1 Apr 2012 31 Mar 2015 Title Surface Area Analysis Using the Brunauer Emmett Teller BET Method Standard Operating Procedure Series SOP C Descriptive Note Technical Report 30 Sep

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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 **Additives in Polymers** Jan C. J. Bart, 2005-04-08 This industrially relevant resource covers all established and emerging analytical methods for the deformation of polymeric materials with emphasis on the non polymeric components Each technique is evaluated on its technical and industrial merits Emphasis is on understanding principles and characteristics and industrial applicability Extensively illustrated throughout with over 200 figures 400 tables and 3 000 references **Supercritical Fluid Technology in Materials Science and Engineering** Ya-Ping Sun, 2002-03-26 This title analyzes the chemical reactions structures and fundamental properties of supercritical fluid systems for the production of new compounds nanomaterials fibers and films It compiles contemporary research and technological advances for increased selectivity and reduced waste in chemical industrial pharmaceutical and biomedical applications Topics include fluid dynamics catalysis hydrothermal synthesis surfactants conducting polymers crystal growth and other aspects and applications of supercritical fluids Polymer Particles Masayoshi Okubo, 2005-02-10 In this special volume on polymer particles recent trends and developments in the synthesis of nano to micron sized polymer particles by radical polymerization Emulsion Miniemulsion Microemulsion and Dispersion Polymerizations of vinyl monomers in environmentally friendly heterogeneous aqueous and supercritical carbon dioxide fluid media are reviewed by prominent worldwide researchers In addition to the important challenges and possibilities with regards to design and preparation of functionalized polymer particles of controlled size the topics described are of great current interest due to the increased awareness of environmental issues

Supercritical Fluid Cleaning Fundamentals Technology And Applications Book Review: Unveiling the Power of Words

In some sort of driven by information and connectivity, the energy of words has be evident than ever. They have the capability to inspire, provoke, and ignite change. Such is the essence of the book **Supercritical Fluid Cleaning Fundamentals Technology And Applications**, a literary masterpiece that delves deep in to the significance of words and their impact on our lives. Published by a renowned author, this captivating work takes readers on a transformative journey, unraveling the secrets and potential behind every word. In this review, we shall explore the book is key themes, examine its writing style, and analyze its overall effect on readers.

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