

# Fine Particles Science and Technology From Micro to Nanoparticles

Edited by

Ezio Pelizzetti

NATO ASI Series

# Fine Particles Science And Technology From Micro To Nanoparticles

**Nissim Garti, D. Julian McClements** 

# Fine Particles Science And Technology From Micro To Nanoparticles:

Fine Particles Science and Technology E. PELIZZETTI, 2012-12-06 Fine Particles Science and Technology deals with the preparation characterization and technological applications of monodisperse particles in the micro to nano size range A broad view of this frontier field is given covering understanding the mechanisms by which uniform fine particles are formed and the search for new processes the mechanism of the precipitation technique requiring knowledge of the relationship between the complex solution chemistry and the products formed the sequence of events leading to the formation of monodisperse colloids The following topics are presented microparticles nanoparticles applications in the preparation of materials synthesis and properties environmental applications and many others Encapsulation Technologies and Delivery Systems for Food Ingredients and Nutraceuticals Nissim Garti, D. Julian McClements, 2012-10-19 Improved technologies for the encapsulation protection release and enhanced bioavailability of food ingredients and nutraceutical components are vital to the development of future foods Encapsulation technologies and delivery systems for food ingredients and nutraceuticals provides a comprehensive guide to current and emerging techniques Part one provides an overview of key requirements for food ingredient and nutraceutical delivery systems discussing challenges in system development and analysis of interaction with the human gastrointestinal tract Processing technologies for encapsulation and delivery systems are the focus of part two Spray drying cooling and chilling are reviewed alongside coextrusion fluid bed microencapsulation microencapsulation methods based on biopolymer phase separation and gelation phenomena in aqueous media Part three goes on to investigate physicochemical approaches to the production of encapsulation and delivery systems including the use of micelles and microemulsions polymeric amphiphiles liposomes colloidal emulsions organogels and hydrogels Finally part four reviews characterization and applications of delivery systems providing industry perspectives on flavour fish oil iron micronutrient and probiotic delivery systems With its distinguished editors and international team of expert contributors Encapsulation technologies and delivery systems for food ingredients and nutraceuticals is an authoritative guide for both industry and academic researchers interested in encapsulation and controlled release systems Provides a comprehensive guide to current and emerging techniques in encapsulation technologies and delivery systems Chapters in part one provide an overview of key requirements for food ingredient and nutraceutical delivery systems while part two discusses processing technologies for encapsulation and delivery systems Later sections investigate physicochemical approaches to the production of encapsulation and delivery systems and review characterization and applications of delivery systems **Drug Delivery Strategies for Poorly Water-Soluble Drugs** Dionysios Douroumis, Alfred Fahr, 2012-12-19 Many newly proposed drugs suffer from poor water solubility thus presenting major hurdles in the design of suitable formulations for administration to patients Consequently the development of techniques and materials to overcome these hurdles is a major area of research in pharmaceutical companies Drug Delivery Strategies for Poorly Water Soluble Drugs provides a comprehensive overview of

currently used formulation strategies for hydrophobic drugs including liposome formulation cyclodextrin drug carriers solid lipid nanoparticles polymeric drug encapsulation delivery systems self microemulsifying drug delivery systems nanocrystals hydrosol colloidal dispersions microemulsions solid dispersions cosolvent use dendrimers polymer drug conjugates polymeric micelles and mesoporous silica nanoparticles For each approach the book discusses the main instrumentation operation principles and theoretical background with a focus on critical formulation features and clinical studies Finally the book includes some recent and novel applications scale up considerations and regulatory issues Drug Delivery Strategies for Poorly Water Soluble Drugs is an essential multidisciplinary guide to this important area of drug formulation for researchers in industry and academia working in drug delivery polymers and biomaterials Silicone Dispersions Yihan Liu, 2017-01-06 Silicone is an important class of materials used in applications that range from industrial assembly to everyday consumer products Silicones are often delivered and synthesized in dispersion forms the most common being liquid in liquid emulsion solid in liquid suspension air in liquid foam and solid in air powder This book compiles a carefully selected number of topics that are essential to the understanding creative design and production of silicone dispersions As such it provides the first unified description of silicone dispersions in the literature Nanoparticles and Catalysis Didier Astruc, 2008-06-25 Written by international experts this monograph combines two of the most important aspects of modern chemistry presenting the latest knowledge on these environmental friendly applications This result is a comprehensive overview of the application of nanoparticles in catalysis focusing on synthesis and the most important reaction types providing all the information needed by catalytic organic and solid state chemists as well as those working with or on organometallics materials scientists and chemists in industry An Introduction to Dynamics of Colloids J.K.G. Dhont, 1996-05-20 One of the few textbooks in the field this volume deals with several aspects of the dynamics of colloids A self contained treatise it fills the gap between research literature and existing books for graduate students and researchers For readers with a background in chemistry the first chapter contains a section on frequently used mathematical techniques as well as statistical mechanics Some of the topics covered include diffusion of free particles on the basis of the Langevin equation the separation of time length and angular scales the fundamental Fokker Planck and Smoluchowski equations derived for interacting particles friction of spheres and rods and hydrodynamic interaction of spheres including three body interactions diffusion sedimentation critical phenomena and phase separation kinetics experimental light scattering results For universities and research departments in industry this textbook makes vital reading Physics and Applications of Complex Plasmas Sergey V. Vladimirov, Kostya Ostrikov, Alex A. Samarian, 2005 At the frontiers of physics and chemistry lies the new and rapidly emerging area of complex plasma systems The study of complex plasma systems that contain colloid nano microscopic particles is now actively pursued in a diverse range of scientific fields OCo from plasma and gas discharge physics to astrophysics materials science and engineering This book highlights in a systematic insightful and perceptive way the fundamental physics and industrial

applications of complex plasmas with emphasis on the conditions relevant to laboratory gas discharges and industrial plasma reactors It provides a specialized and comprehensive description of the most recent theoretical experimental and modeling efforts to understand the unique properties of complex plasma systems involving the stability dynamics and self organization of colloid particles and their associations Special attention is focused on the physical understanding of up to date developments in major technological applications of micron and nano sized particles Each chapter is presented in a concise and comprehensive manner with a categorized overview of the underlying physics followed by an in depth description The book will appeal to scientists and researchers as well as undergraduate and graduate students wishing to explore the flourishing interdisciplinary field of complex plasma systems Micro- and Nanotechnologies-Based Product **Development** Neelesh Kumar Mehra, Arvind Gulbake, 2021-09-06 This book provides comprehensive information of the nanotechnology based pharmaceutical product development including a diverse range of arenas such as liposomes nanoparticles fullerenes hydrogels thermally responsive externally activated theranostics TREAT hydrogels microspheres micro and nanoemulsions and carbon nanomaterials It covers the micro and nanotechnological aspects for pharmaceutical product development with the product development point of view and also covers the industrial aspects novel technologies stability studies validation safety and toxicity profiles regulatory perspectives scale up technologies and fundamental concept in the development of products Salient Features Covers micro and nanotechnology approaches with current trends with safety and efficacy in product development Presents an overview of the recent progress of stability testing reverse engineering validation and regulatory perspectives as per regulatory requirements Provides a comprehensive overview of the latest research related to micro and nanotechnologies including designing optimisation validation and scale up of micro and nanotechnologies Is edited by two well known researchers by contribution of vivid chapters from renowned scientists across the globe in the field of pharmaceutical sciences Dr Neelesh Kumar Mehra is working as an Assistant Professor of Pharmaceutics Biopharmaceutics at the Department of Pharmaceutics National Institute of Pharmaceutical Education Research NIPER Hyderabad India He received TEAM AWARD for successful commercialisation of an ophthalmic suspension product He has authored more than 60 peer reviewed publications in highly reputed international journals and more than 10 book chapter contributions He has filed patents on manufacturing process and composition to improved therapeutic efficacy for topical delivery He guided PhD and MS students for their dissertations research projects He has received numerous outstanding awards including Young Scientist Award and Team Award for his research output He recently published one edited book Dendrimers in Nanomedicine Concept Theory and Regulatory Perspectives in CRC Press Currently he is editing books on nano drug delivery based products with Elsevier Pvt Ltd He has rich research and teaching experience in the formulation and development of complex innovative ophthalmic and injectable biopharmaceutical products including micro and nanotechnologies for regulated market Dr Arvind Gulbake is working as an Assistant Professor at the Faculty of

Pharmacy School of Pharmaceutical Population Health Informatics at DIT University Dehradun India He has authored more than 40 peer reviewed publications in highly reputed international journals four book chapters and a patent contribution He has received outstanding awards including Young Scientist Award and BRG Travel Award for his research He is an assistant editor for IJAP He guided PhD and MS students for their dissertations research projects He has successfully completed extramural project funded by SERB New Delhi Government of India He has more than 12 years of research and teaching experience in the formulation and development of nanopharmaceuticals Challenges in Characterizing Small Particles National Research Council, Division on Earth and Life Studies, Board on Chemical Sciences and Technology, Chemical Sciences Roundtable, 2012-05-02 Small particles are ubiquitous in the natural and built worlds and have tremendous impact throughout However a lack of understanding about the properties and chemical composition of small particles limits our ability to predict and control their applications and impacts Challenges in Characterizing Small Particles Exploring Particles from the Nano to Microscales summarizes presentations and discussions at a 2010 National Academies roundtable Speakers at this roundtable discussed the crucial types of information that need to be determined about small particles in different media They also explored the critical importance of small particles in environmental science materials and chemical sciences biological science and engineering and the many challenges involved in characterizing materials at the nano and microscales The discussions on characterization included static dynamic experimental computational and theoretical characterization The workshop also included several research tool presentations that highlighted new advances in characterizing small particles

Advances in Imaging and Electron Physics ,2013-04-30 Advances in Imaging and Electron Physics features cutting edge articles on the physics of electron devices especially semiconductor devices particle optics at high and low energies microlithography image science and digital image processing electromagnetic wave propagation electron microscopy and the computing methods used in all these domains Contributions from leading authorities Informs and updates on all the latest developments in the field Nanotechnology for Agriculture Deepak G Panpatte, Yogeshvari K Jhala, 2019-11-16 The emergence of nanotechnology and the development of new nano devices and nanomaterials open up opportunities for novel applications in agriculture and biotechnology Nanotechnology has the potential to modernize the agricultural research and practice Nanotechnology has gained momentum in agriculture sector during last decade but still there are knowledge gap between scientific communities This book comprise of holistic coverage about current developments in nanotechnology based sustainable agriculture It contains sections focusing on each aspect of the implications of nanotechnology in different sectors of agriculture from crop production soil fertility management crop improvement etc It also provides insight into the current trends and future prospects of nanotechnology along with the benefits and risks and their impact on agricultural ecosystems. This book emphasize on use of nanotechnology to reduce agrochemical usage via smart delivery system increase nutrient use efficiency improved water and nutrient management nano biosensors for management of plant diseases etc The book

provides thorough knowledge for dealing with current challenges of agricultural sector using nanotechnology based agricultural interventions It will serve as reference literature for scientists policymakers students and researchers who are engaged in development of strategies to cope up with challenges of current agricultural systems and society of Nanostructured Materials and Nanotechnology, Five-Volume Set Hari Singh Nalwa, 1999-10-29 Nanostructured materials is one of the hottest and fastest growing areas in today s materials science field along with the related field of solid state physics Nanostructured materials and their based technologies have opened up exciting new possibilites for future applications in a number of areas including aerospace automotive x ray technology batteries sensors color imaging printing computer chips medical implants pharmacy and cosmetics. The ability to change properties on the atomic level promises a revolution in many realms of science and technology Thus this book details the high level of activity and significant findings are available for those involved in research and development in the field It also covers industrial findings and corporate support This five volume set summarizes fundamentals of nano science in a comprehensive way The contributors enlisted by the editor are at elite institutions worldwide Key Features Provides comprehensive coverage of the dominant technology of the 21st century Written by 127 authors from 16 countries making this truly international First and only reference to cover all aspects of nanostructured materials and nanotechnology Nanostructured Materials and Nanotechnology Hari Singh Nalwa, 2002 Nanotechnology Provides comprehensive coverage of the dominant technology of the 21st century Written NANOMATERIALS Effective Tool for Chemical Transformations Dr. by a truly international list of contributors Ramdas Dhokale, 2019-09-12 The era of nanoscience and its technology has become increasingly important in last two decades and this encompasses a vast range of unimaginable applications for forthcoming decades Investigators are engaged in the manipulation of materials in the nano scale for studying their properties with making the desirable devices The range between 1 100 nm nm nanometer is generally considered as a nano scale and this scale is basically useful for measurement of the dimensions length or width or area or height of particles or constituents or atoms or molecules etc. At this scale everything regardless of what it is has different properties to that of their bulk counterparts and these make nano so fascinating Particulate Emissions from Vehicles Peter Eastwood, 2008-04-15 The public health risks posed by automotive particulate emissions are well known Such particles are sufficiently small to reach the deepest regions of the lungs and moreover act as carriers for many potentially toxic substances Historically diesel engines have been singled out in this regard but recent research shows the need to consider particulate emissions from gasoline engines as well Already implicated in more than one respiratory disease the strongest evidence in recent times points to particle mediated cardiovascular disorders strokes and heart attacks Accordingly legislation limiting particulate emissions is becoming increasingly stringent placing great pressure on the automotive industry to produce cleaner vehicles pressure only heightened by the ever increasing number of cars on our roads Particulate Emissions from Vehicles addresses a field of

increased international interest and research activity discusses the impact of new legislation globally on the automotive industry and explains new ways of measuring particle size number and composition that are currently under development The expert analysis and summary of the state of the art which encompasses the key areas of combustion performance measurement techniques and toxicology will appeal to R D practitioners and engineers working in the automotive industry and related mechanical fields as well as postgraduate students and researchers of engine technology air pollution and life environmental science The public health aspects will also appeal to the biomedical research community Nanoscience and Technology, 2010-10-29 From the Introduction Nanotechnology and its underpinning sciences are progressing with unprecedented rapidity With technical advances in a variety of nanoscale fabrication and manipulation technologies the whole topical area is maturing into a vibrant field that is generating new scientific research and a burgeoning range of commercial applications with an annual market already at the trillion dollar threshold The means of fabricating and controlling matter on the nanoscale afford striking and unprecedented opportunities to exploit a variety of exotic phenomena such as quantum nanophotonic and nanoelectromechanical effects Moreover researchers are elucidating new perspectives on the electronic and optical properties of matter because of the way that nanoscale materials bridge the disparate theories describing molecules and bulk matter Surface phenomena also gain a greatly increased significance even the well known link between chemical reactivity and surface to volume ratio becomes a major determinant of physical properties when it operates over nanoscale dimensions Against this background this comprehensive work is designed to address the need for a dynamic authoritative and readily accessible source of information capturing the full breadth of the subject Its six volumes covering a broad spectrum of disciplines including material sciences chemistry physics and life sciences have been written and edited by an outstanding team of international experts Addressing an extensive cross disciplinary audience each chapter aims to cover key developments in a scholarly readable and critical style providing an indispensible first point of entry to the literature for scientists and technologists from interdisciplinary fields The work focuses on the major classes of nanomaterials in terms of their synthesis structure and applications reviewing nanomaterials and their respective technologies in well structured and comprehensive articles with extensive cross references It has been a constant surprise and delight to have found amongst the rapidly escalating number who work in nanoscience and technology so many highly esteemed authors willing to contribute Sharing our anticipation of a major addition to the literature they have also captured the excitement of the field itself in each carefully crafted chapter Along with our painstaking and meticulous volume editors full credit for the success of this enterprise must go to these individuals together with our thanks for largely adhering to the given deadlines Lastly we record our sincere thanks and appreciation for the skills and professionalism of the numerous Elsevier staff who have been involved in this project notably Fiona Geraghty Megan Palmer and Greg Harris and especially Donna De Weerd Wilson who has steered it through from its inception We have greatly enjoyed working with them

all as we have with each other *Computational Fluid Dynamics and Heat Transfer* Ryoichi Amano, Bengt Sundén, 2011 Heat transfer and fluid flow issues are of great significance and this state of the art edited book with reference to new and innovative numerical methods will make a contribution for researchers in academia and research organizations as well as industrial scientists and college students The book provides comprehensive chapters on research and developments in emerging topics in computational methods e g the finite volume method finite element method as well as turbulent flow computational methods Fundamentals of the numerical methods comparison of various higher order schemes for convection diffusion terms turbulence modeling the pressure velocity coupling mesh generation and the handling of arbitrary geometries are presented Results from engineering applications are provided Chapters have been co authored by eminent researchers

Advances in Nanotechnology Research and Application: 2011 Edition, 2012-01-09 Advances in Nanotechnology Research and Application 2011 Edition is a ScholarlyEditions eBook that delivers timely authoritative and comprehensive information about Nanotechnology The editors have built Advances in Nanotechnology Research and Application 2011 Edition on the vast information databases of ScholarlyNews You can expect the information about Nanotechnology 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 Advances in Nanotechnology Research and Application 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 Medical Applications of Colloids Egon Matijevic, 2008-12-05 The important role of nely dispersed matter and surfaces in medicine is not always fully understood and appreciated Speci cally ne particles solid or liquid in the size range of several nanometers to several micrometers have a tremendous effect on our lives because they can be bene cial or detrimental to our well being Such particles are present in living bodies as red blood cells or cholesterol crystals in the gall bladder They are ubiquitous in the environment where they can cause many diseases such as asbestosis silicosis and black lung disease but they are also used in diagnostic tests drug delivery and numerous other applications More recently evidence has become available that drug formulations with active components in a nely dispersed state may signi cantly affect their functionality Furthermore with miniaturization of medical instrumentation the size of the components is necess ily reduced to colloid or even smaller range This volume is a collection of several chapters dealing with diverse topics of colloids and surfaces relevant to medical applications Thus Siiman describes the use of optical properties of uniform colloidal particles as probes in ow cytometry Giesche focuses on the preparations and properties of exceedingly uniform silica spheres for different uses such as in chromatography In modi ed forms silica p ticles with incorporated dyes are employed in diagnostics and those combined with tiny magnetic entities in drug delivery **Nanoscale Interactions of** 

Metal-containing Polymers Alaa S. Abd-El-Aziz,2006 This series provides a useful applications oriented forum for the next generation of macromolecules and materials Applications are to include non linear optical materials specialty magnetic materials liquid crystals anticancer and antiviral drugs treatment of arthritis antibacterial drugs antifouling materials treatment of certain vitamin deficiencies electrical conductors and semiconductors piezoelectronic materials electrodes UV absorption applications super strength materials special lubricants and gaskets selective catalytic and multi site catalytic agents This volume in the series will cover\_nanoscale interactions of metal containing polymers chapters include Nanoscale Clusters and Molecular Orbital Interactions in Macromolecular Metal Complexes Metal Oxide Clusters as Building Blocks for Inorganic Organic Hybrid Polymers and more

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