Advances in Polymer Science


Volume 247

S. Kunugi, Kyoto Institute of Technology, Japan; T. Yamaoka, National Cerebral and Cardiovascular Center Research Institute (NCVC), Osaka, Japan (Eds)

Polymers in Nanomedicine

C. Backes, University Erlangen-Nürnberg, Fürth, Germany

Noncovalent Functionalization of Carbon Nanotubes

Fundamental Aspects of Dispersion and Separation in Water

In this thesis, Claudia Backes guides the reader through her multidisciplinary research into the non-covalent functionalization of carbon nanotubes in water. Although one of the most remarkable materials of the 21st century, carbon nanotubes often have limited application because of their intrinsically low solubility and polydispersity. The author shows that rational surfactant design is a powerful tool for chemists because it can unmask the key to solubilization and allow us to tailor nanotube surface and optical properties in a fully reversible fashion. Aspects of organic, physical, and analytical chemistry, as well as colloidal sciences are covered in this outstanding work which brings us one step closer to exploiting this super-material to its full potential.

Features

- Highest Impact Factor of all publications ranked by ISI within Polymer Science
- Short and concise reports on physics and chemistry of polymers, each written by the world renowned experts
- Still valid and useful after 5 or 10 years
- The electronic version is available free of charge for standing order customers at: springer.com/series/12/

Fields of interests

Polymer Sciences; Medical Biochemistry; Biomaterials

Target groups

Research

Product category

Reviews

Due January 2012

2012, XII, 272 p. Hardcover

* € (D) 245,03 | € (A) 251,90 | sFr 305,00
* € 229,00 | £206.50
ISBN 978-3-642-27855-6

M. E. Gracheva, Clarkson University, Potsdam, NY, USA (Ed)

Nanopore-Based Technology

Features

- Provides a good representation of present-day available techniques for biomolecule characterization with nanoporous membranes
- Includes many step-by-step, easy to follow protocols
- Features tips from the experts to ensure successful implementation

Contents


Fields of interests

Biotechnology; Nanotechnology

Target groups

Professional/practitioner

Product category

Contributed volume

Due February 2012

2012, XIV, 203 p. 111 illus., 93 in color. (Springer Theses) Hardcover

* € (D) 106,95 | € (A) 109,95 | sFr 133,50
* € 99,95 | £90.00
ISBN 978-3-642-27581-4

Due April 2012

2012, XIV, 250 p. 85 illus., 47 in color. (Methods in Molecular Biology, Volume 870) Hardcover

* € (D) 101,60 | € (A) 104,45 | sFr 126,50
* € 94,95 | £85.50
Catalysis for Alternative Energy Generation

The increase of greenhouse gases in the atmosphere and the decrease of the available amount of fossil fuels necessitate finding new alternative and sustainable energy sources in the near future. This book summarizes the role and the possibilities of catalysis in the production of new energy carriers and in the utilization of different energy sources. The main goal of this work is to go beyond those results discussed in recent literature by identifying new developments that may lead to breakthroughs in the production of alternative energy.

Features
- Summarizes recent problems in using catalysts in alternative energy generation and proposes novel solutions
- Reconsiders the role of catalysis in alternative energy generation
- Contributors include catalysis and alternative energy experts from across the globe

Contents

Fields of interests
Catalysis; Renewable and Green Energy; Industrial Chemistry/Chemical Engineering

Target groups
Research

Product category
Monograph

Due April 2012

2012. XII. 325 p. 180 illus., 47 in color. Hardcover
- € (D) 139,05 | € (A) 142,94 | sFr 173,00
- € 129,95 | £117.00
ISBN 978-3-642-27620-0

L. Gucci, Institute of Isotopes, Budapest, Hungary; A. Erdöhelyi, University of Szeged, Hungary (Eds)

Conducting Polymers
A New Era in Electrochemistry

This second edition of a well-received volume has been thoroughly updated and expanded to cover the most recent developments. Coverage now includes additional polymers such as polyindole and polyazines, composites of polymers with carbon nanotubes, metals, and metal oxides, as well as bending-beam techniques for characterization.

Again, the author provides a systematic survey of the knowledge accumulated in this field in the last thirty years. This includes thermodynamic aspects, the theory of the mechanism of charge transport processes, the chemical and physical properties of these compounds, the techniques of characterization, the chemical and electrochemical methods of synthesis as well as the application of these systems. The book contains a compilation of the polymers prepared so far and covers the relevant literature with almost 2000 references.

Features
- Thoroughly updated and expanded new edition
- Systematic approach regarding the preparation, characterization and application of these materials
- Almost 2000 references to the scientific literature

Contents
Introduction.- Classification of Electrochemically Active Polymers.- Methods of Investigation.- Chemical and Electrochemical Syntheses of Conducting Polymers.- Thermodynamic Considerations.- Redox Transformations and Transport Processes.- Applications of Conducting Polymers.- Historical Background (Or: There Is Nothing New Under the Sun).

Fields of interests
Electrochemistry; Optical and Electronic Materials; Polymer Sciences

Target groups
Research

Product category
Monograph

Due April 2012

2nd ed. 2012. 320 p. 84 illus., 2 in color. (Monographs in Electrochemistry) Hardcover
- approx. * € (D) 139,05 | € (A) 142,94 | sFr 173,00
- approx. € 129,95 | £117.00
ISBN 978-3-642-27620-0

G. Inzelt, Eötvös Lorand Univ., Budapest, Hungary

Laser Techniques for the Study of Electrode Processes

Laser-enabled measurements are valuable tools for the investigation of surfaces and interfaces or for the in situ investigation of interfacial processes including electrode processes. The understanding of the thermodynamics of solid/liquid surfaces is important for surface science and electrochemistry. In the first part of this book, the authors describe a range of techniques for investigating interfacial tension and surface stress, which is important for coatings, thin films, and fuel cells.

Features
- First comprehensive treatment of this field
- Relevant for research on fuel cells, supercapacitors, thin films, and coatings

Contents

Fields of interests
Electrochemistry; Characterization and Evaluation of Materials; Surface and Interface Science, Thin Films

Target groups
Research

Product category
Monograph

Due April 2012

2012. 150 p. 111 illus. (Monographs in Electrochemistry) Hardcover
- approx. * € (D) 106,95 | € (A) 109,95 | sFr 143,50
- approx. € 99,95 | £90.00
ISBN 978-3-642-27650-7

G. G. Láng, University Budapest, Hungary; C. A. Barbero, Universidad Nacional de Rio Curato, Argentina
G. Lofrano, University of Salerno, Fisciano, Italy (Ed)

**Emerging Compounds Removal from Wastewater**

**Natural and Solar Based Treatments**

In the last years the release of emerging pollutants such as Endocrine Disruptors (EDCs), Pharmaceuticals and Personal Care Products (PPCPs) into the environment has raised great concern. While investigating how to treat emerging pollutants from water and wastewater, researchers have drawn attention on the implementation of more environmentally friendly technologies able to achieve high removal efficiency at low costs.

Emerging Compounds Removal from Wastewater by Green Technologies: Natural and Solar Based Treatments introduces green chemistry in relation to these treatment technologies. More specifically, this volume:

- Evaluates the potential of constructed wetlands for the removal of some categories of trace contaminant of worldwide relevance in view of their application as decentralized systems.
- Highlights the promising role of advanced oxidation processes that use natural adsorbents natural materials or agricultural waste in light of the inefficiency of conventional wastewater treatment plants.
- Reviews the suitability of alternative adsorption processes that use natural adsorbents natural materials or agricultural waste in light of the inefficiency of conventional wastewater treatment plants.
- Shows the potential of constructed wetlands for the removal of some categories of trace contaminant of worldwide relevance in view of their application as decentralized systems.

**Feature**

- Explores water treatment technologies and their effective implementations

**Fields of interests**

- Industrial Chemistry/Chemical Engineering; Environmental Chemistry; Waste Water Technology / Water Pollution Control / Water Management / Aquatic Pollution

**Target groups**

- Research

**Product category**

- Brief

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**S. Djokić**, Elchem Consulting Ltd., Edmonton, AB, Canada (Ed)

**Electrochemical Production of Metal Powders**

This new volume of Modern Aspects of Electrochemistry reviews different methods for the production of metal powders including mechanical, chemical and electrochemical powders. Electrochemically produced metal powders are of high purity and they are extremely active during sintering. These powders find a wide-range of applications in automotive, aerospace, energy device and electronics industries.

**Features**

- First book to summarize results related to the electrochemical production of powders
- Edited by the foremost expert on industrial applications of electrodeposition
- Latest entry in a well-known and established series

**Contents**

Fundamental aspects of disperse metals electrodeposition.
- Powdered deposits: types, properties and modelling.
- Open and porous copper electrodes formed by the constant and the periodically changing regimes of electrolysis.
- Morphology of different electrodeposited pure metal powders.
- Morphology, chemical and phase composition of electrodeposited Co-Ni, Fe-Ni and Mo-Ni-O powders.
- Electrochemical synthesis of dispersed metallic nanoparticles.
- Metallic powders produced by electrodeless deposition.

**Fields of interests**

- Electrochemistry; Industrial Chemistry/Chemical Engineering; Metallic Materials

**Target groups**

- Professional/practitioner

**Product category**

- Professional book
Biomedical Applications

Various metallic or non-metallic surfaces are frequently treated by electrochemical methods (e.g. electrodeposition, electroless deposition, anodization, passivation, etc.) in order to achieve a desirable property important for biomedical applications. Applications include orthopedic or dental implants, dressings for wound healing and different skin diseases, surfaces for the prevention of bio-film formation of corrosion inhibition in biological media. The aim of this issue of Modern Aspects of Electrochemistry is to review the latest developments of the surface treatments for biomedical applications in relation to electrochemical science and technology.

Features
► Reviews the latest developments of the surface treatments for biomedical applications in relation to electrochemical science and technology ► Details new concepts that may have significant implications on future practical applications ► Appeals to scientists, researchers, engineers and students alike

Contents
CoCrMo alloy for biomedical applications.- Electrodeposition synthesis of metallic nanomaterials for biomedical applications.- Biodegradable Mg alloys: Corrosion, surface modification and biocompatibility.- Microcantilever sensors: Electrochemical aspects and biomedical applications.- Surface treatments with silver and its compounds for biomedical applications.

Fields of interests
Electrochemistry; Biomedical Engineering

Target groups
Research

Product category
Monograph

M. Orlik, University of Warsaw, Poland
Self-Organisation in Electrochemical Systems I

General Principles of Selforganization. Temporal Instabilities

This is the second of two volumes offering the very first comprehensive treatise of self-organisation and non-linear dynamics in electrochemical systems. The first volume covers general principles of self-organisation as well as temporal instabilities. The content of both volumes is organized so that each description of a particular electrochemical system is preceded by an introduction to basic concepts of non-linear dynamics, in order to help the reader unfamiliar with this discipline to understand at least fundamental concepts and the methods of stability analysis.

Features
► Marek Orlik presents the first comprehensive treatment of self-organizing systems and non-linear dynamics in the field of electrochemistry ► First of two volumes dedicated to this topic ► Clear presentation of fundamental concepts

Contents

Fields of interests
Electrochemistry; Neurosciences; Physical Chemistry

Target groups
Research

Product category
Monograph

M. Orlik, University of Warsaw, Poland
Self-Organisation in Electrochemical Systems II

Spatiotemporal Patterns and Control of Chaos

This is the second of two volumes offering the very first comprehensive treatise of self- organisation and non-linear dynamics in electrochemical systems. The first volume covers general principles of self- organisation as well as temporal instabilities. The content of both volumes is organized so that each description of a particular electrochemical system is preceded by an introduction to basic concepts of non-linear dynamics, in order to help the reader unfamiliar with this discipline to understand at least fundamental concepts and the methods of stability analysis.

Features
► Marek Orlik presents the first comprehensive treatment of self-organizing systems and non-linear dynamics in the field of electrochemistry ► Second of two volumes dedicated to this topic ► Clear presentation of fundamental concepts

Contents
Theoretical background of spatial and spatiotemporal patterns in dynamical systems.- Experimental and model spatiotemporal patterns in electrochemical systems.- Cooperative dynamics of coupled and forced oscillators.- Spatial and spatiotemporal patterns in anodized semiconductors.- Convection as a source of self-organization in electrochemical systems.- Liquid membrane and other membrane oscillators.- Control of electrochemical chaos and unstable steady-states.

Fields of interests
Electrochemistry; Neurosciences; Statistical Physics, Dynamical Systems and Complexity

Target groups
Research

Product category
Monograph
Silicon Surface Science

Silicon Surface Science offers a survey of the major topics concerning the properties and behavior of silicon surfaces. It covers all main aspects of the subject, including: polydimethylsiloxane, spread monolayers, self-assembled monolayers, hydrophobicity and super-hydrophobicity, coupling agents, surfactants, fluoro-silicones, surface treatments and surface analysis.

Features
- Provides a timely summary of important aspects of silicon surface science
- Comprehensive in scope
- Written by well known authors

Contents

Fields of interests
Polymer Sciences; Surfaces and Interfaces, Thin Films

Target groups
Research

Product category
Monograph

Principles of Polymer Chemistry

This successful textbook undergoes a change of character in the third edition. Where earlier editions covered organic polymer chemistry, the third edition covers both physical and organic chemistry. Thus kinetics and thermodynamics of polymerization reactions are discussed.

Features
- New material on the chemistry of polymeric materials for special applications
- These subjects are currently of considerable interest in industry and academia
- Only Polymer textbook that combines Organic and Physical Chemistry
- Thus, for instance, in each chapter that deals with polymer preparations, both the kinetics and the thermodynamics of the reactions are discussed
- All figures are updated in this edition
- Physical properties of polymers are expanded and placed into a separate chapter and include such subjects as elasticity and rheology of polymers as well as a thorough discussion of the transition temperatures
- This is done to accommodate students who do not receive a separate course on physical properties of polymers

Contents

Fields of interests
Polymer Sciences; Organic Chemistry; Physical Chemistry

Target groups
Graduate

Product category
Graduate/Advanced undergraduate textbook

From the Molecular World

A Nineteenth-Century Science Fantasy
Coauthor: H. Kopp, Heidelberg, Germany

Hermann Kopp (1817–1892) is best remembered today as a historian of chemistry, but during his lifetime he was one of the most eminent chemists of his day, and one of the earliest pioneers of physical chemistry. Late in his career he wrote an endearing fantasy about personified molecules. Published in 1882, Aus der Molecular-Welt (From the Molecular World) portrayed the intimate details of what might actually be happening in the sub-microscopic world; the atoms and molecules we meet there have agency, personalities, sometimes even dialog. Filled with appealing tropes, humor, and whimsical asides, Kopp’s short book provided an examination of the chemistry and physics of his day that was always light-hearted on the surface, but often surprisingly profound. Properly interpreted, the book provides a revealing tour of nineteenth-century debates concerning chemical theory.

Features
- A light-hearted, yet profound examination of the chemistry and physics in the nineteenth century
- Revealing tour of nineteenth century debates concerning chemical theory
- Richly annotated and equipped with an illuminating preface

Contents

Fields of interests
Physical Chemistry; History of Science; History and Philosophical Foundations of Physics

Target groups
Research

Product category
Brief
Chemical Transformations of Vinylidene Cyclopropanes

Modern organic synthesis has paid much attention to the chemistry of small carbocycles. Vinylidene cyclopropanes (VDCPs), which have strained cyclopropyl group connected with an allene moiety and yet are thermally stable and reactive substances in organic chemistry, are versatile intermediates in organic synthesis. In this volume, Dr. Lixiong Shao, Dr. Jianmei Lu and Prof. Dr. Min Shi review their investigations on the chemistry of VDCPs, mainly including the preparation, the reactivities upon treatment with Lewis or Brønsted acid, as well as transition metal catalysts and some other miscellaneous analogues. The contributions aroused a renaissance of cationic intermediates in the chemistry of VDCPs.

Structure and Bonding

J.-P. Sauvage

Contents

Introduction.- Lewis or Brønsted acid-mediated transformations of VDCPs.- Transition metal-catalyzed transformation of VDCPs.- Miscellaneous analogues.- Concluding remarks and perspectives

Fields of interest

Catalysis; Organometallic Chemistry

Target groups

Research

Product category

Brief

Molecular Electronic Structures of Transition Metal Complexes I


Contents


Fields of interest

Inorganic Chemistry

Target groups

Research

Product category

Reviews

Due February 2012

2012. X, 69 p. 83 illus., 6 in color. (SpringerBriefs in Molecular Science) Softcover

Structure and Bonding

J.-P. Sauvage

Series editor: D. M. Mingos


Volume 142

D. M. Mingos, University of Oxford, UK; P. Day, The Royal Institution of Great Britain, London, UK; J. R. Dahl, Technical University of Denmark, Copenhagen, Denmark (Eds)

Molecular Electronic Structures of Transition Metal Complexes II

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Contents


Fields of interest

Inorganic Chemistry

Target groups

Research

Product category

Contributed volume

Due January 2012

2012. XV, 233 p. 43 illus., 10 in color. Hardcover

Chemistry.
Reviews

Product category
Research

Target groups

Topics in Current Chemistry
Series editors: C.-H. Wong, M. Olivucci, C.-H. Wong

Volume 314
N. Matsuo, Dainihon Jochugiku Co. Ltd., Osaka, Japan; T. Mori, Sumitomo Chemical Co., Ltd., Takarazuka-city, Japan (Eds)

Pyrethroids
From Chrysanthemum to Modern Industrial Insecticide

Contents

Fields of interest
Bioorganic Chemistry; Plant Biochemistry; Environmental Chemistry

Target groups
Research

Product category
Reviews

Due February 2012
2012, IX, 224 p. 53 illus., 4 in color. Hardcover
► * € (D) 203,25 | € (A) 208,94 | sFr 253,00
► € 189,95 | £171.00
ISBN 978-3-642-27345-2

Due January 2012
2012, XI, 181 p. 60 illus., 45 in color. Hardcover
► * € (D) 203,25 | € (A) 208,94 | sFr 253,00
► € 189,95 | £171.00
ISBN 978-3-642-27406-0

Due February 2012
2012, XII, 148 p. Hardcover
► * € (D) 203,25 | € (A) 208,94 | sFr 253,00
► € 189,95 | £171.00
ISBN 978-3-642-27359-6
Topics in Current Chemistry

Series editors: C.-H. Wong, M. Olivucci, C.-H. Wong
Volume 318

C. Tschierske, Martin-Luther-University Halle-Wittenberg, Germany (Ed)

Liquid Crystals
Materials Design and Self-assembly

Features

- Highest Impact Factor of all publications ranked by ISI within Polymer Science
- Short and concise reports on physics and chemistry of polymers, each written by the world renowned experts
- Still valid and useful after 5 or 10 years
- The electronic version is available free of charge for standing order customers at: springer.com/series/12/

Contents


Fields of interests

Physical Chemistry; Materials Science, general; Condensed Matter Physics

Target groups

Research

Product category

Reviews

C. S. Vogel, Friedrich-Alexander-University Erlangen-Nuremberg, Germany

High- and Low-Valent tris-N-Heterocyclic Carbene Iron Complexes

A Study of Molecular and Electronic Structure

Carola Vogel’s PhD thesis focuses on the synthesis, and structural and spectroscopic characterization of the first high valent iron nitride complexes. In her interdisciplinary and collaborative research Carola also describes the reactivity studies of a unique iron (V) nitride complex with water. These studies show that quantitative yields of ammonia are given at ambient conditions. High valent iron nitride and oxo species have been proposed as key intermediates in many bio-catalytic transformations, but until now these species have proven exceedingly challenging to isolate and study.

Features

- Nominated by the University of Erlangen-Nuremberg as an outstanding PhD thesis
- Synthesis, structural and spectroscopic characterization of high valent iron nitride complexes
- Addresses the search for iron complexes in high oxidation states

Contents


Fields of interests

Inorganic Chemistry; Catalysis; Enzymology

Target groups

Research

Product category

Monograph

B. L. Yoder, University of British Columbia, Vancouver, BC, Canada

Steric Effects in the Chemisorption of Vibrationally Excited Methane on Nickel

Bruce Yoder’s thesis outlines his investigation of the dissociative chemisorption of methane (CH₄) on a nickel single crystal. In this work Bruce uses a molecular beam and infrared laser techniques to prepare methane in excited rovibrational states. The excited methane molecules are aligned relative to the target nickel surface. Bruce describes the discovery and exploration of a previously unknown steric effect in the dissociation reaction between a vibrationally excited methane molecule and a nickel crystal. From these studies we see that methane molecules are up to twice as reactive when the vibration is aligned parallel rather than perpendicular to the surface.

Features

- Nominated by Ecole Polytechnique Federale de Lausanne, France as an outstanding PhD thesis
- Describes the discovery and exploration of an unknown steric effect in the reaction between a vibrationally excited methane molecule and the surface of a nickel crystal
- The basis for the development of a detailed predictive model for methane chemisorptions

Contents


Fields of interests

Physical Chemistry; Theoretical and Computational Chemistry; Catalysis

Target groups

Research

Product category

Monograph