

Solid State Electrochemistry

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this book describes for the first time in a modern text the fundamental principles on which solid state electrochemistry is based in this sense it is in contrast to other books in the field which concentrate on a description of materials topics include solid ceramic electrolytes glasses polymer electrolytes intercalation electrodes interfaces and applications the different nature of ionic conductivity in ceramic glassy and polymer electrolytes is described as are the thermodynamics and kinetics of intercalation reactions the interface between solid electrolytes and electrodes is discussed and contrasted with the more conventional liquid state electrochemistry the text provides an essential foundation of understanding for postgraduates or others entering the field for the first time and will also be of value in advanced undergraduate courses

the only comprehensive handbook on this important and rapidly developing topic combines fundamental information with a brief overview of recent advances in solid state electrochemistry primarily targeting specialists working in this scientific field particular attention is focused on the most important developments performed during the last decade methodological and theoretical aspects of solid state electrochemistry as well as practical applications the highly experienced editor has included chapters with critical reviews of theoretical approaches experimental methods and modeling techniques providing definitions and explaining relevant terminology as necessary several other chapters cover all the key groups of the ion conducting solids important for practice namely cationic protonic oxygen anionic and mixed conductors but also conducting polymer and hybrid materials finally the whole is rounded off by brief surveys of advances in the fields of fuel cells solid state batteries electrochemical sensors and other applications of ion conducting solids due to the very interdisciplinary nature of this topic this is of great interest to material scientists polymer chemists physicists and industrial scientists too

the handbook of solid state electrochemistry is a one stop resource treating the two main areas of solid state electrochemistry electrochemical properties of solids such as oxides halides and cation conductors and electrochemical kinetics and mechanisms of reactions occurring on solid electrolytes including gas phase electrocatalysis the fund

the ideal addition to the companion volume on fundamentals methodologies and applications this second volume combines fundamental information with an overview of the role of ceramic membranes electrodes and interfaces in this important interdisciplinary and rapidly developing field written primarily for specialists working in solid state electrochemistry this first comprehensive handbook on the topic focuses on the most important developments over the last decade as well as the methodological and theoretical aspects and practical applications this makes the contents equally of interest to material physical and industrial scientists and to physicists also available as a two volume set

the book comprehensively views the intersection between electrochemistry and botany it attempts to inform people about the capacity of electrochemistry to provide information of interest to plant science this includes electrophysiology plant communication and plant defense responses as well as chemoecological and phylogenetic aspects conversely the book also treats the capabilities of vegetal systems and vegetal derived materials to be used in electrochemical applications for sensing energy production and storage and environmental issues

this book features the essential material for any graduate or advanced undergraduate course covering solid state electrochemistry it provides the reader with fundamental course notes and numerous solved exercises making it an invaluable guide and compendium for students of the subject the book places particular emphasis on enhancing the reader's expertise and comprehension of thermodynamics the kräger vink notation the variation in stoichiometry in ionic compounds and of the different types of electrochemical measurements together with their technological applications containing almost 100 illustrations a glossary and a bibliography the book is particularly useful for master and phd students industry engineers university instructors and researchers working with inorganic solids in general

from reviews of the previous volumes this is an essential book for researchers in electrochemistry it covers areas of both fundamental and practical importance with reviews of high quality the material is very well presented and the choice of topics reflects a balanced editorial policy that is welcomed the analyst all the contributions in this volume are well up to the standard of this excellent series and will be of great value to electrochemists the editors again deserve to be congratulated on this fine collection of reviews journal of electroanalytical chemistry and interfacial chemistry competently and clearly written berichte der bunsen gesellschaft für physikalische chemie

electrochemistry of porous materials describes essential theoretical aspects of the electrochemistry of nanostructured materials and primary applications incorporating the advances in the field in the last ten years including recent theoretical formulations and the incorporation of novel materials concentrating on nanostructured micro and mesoporous materials the highly anticipated second edition offers a more focused and practical analysis of key porous materials considered relatively homogeneous from an electrochemical point of view the author details the use of electrochemical methods in materials science for characterization and their applications in the fields of analysis energy production and storage environmental remediation and the biomedical arena additional features include incorporates new theoretical advances in the voltammetry of porous materials and multiphase porous electrochemistry includes new developments in sensing energy production and storage degradation of pollutants desalination and drug release describes redox processes for different porous materials assessing their electrochemical applications written at an accessible and understandable level for researchers and graduate students working in the field of material chemistry selective and streamlined electrochemistry of porous materials second edition culls a wide range of relevant and practically useful material from the extensive literature on the subject making it an invaluable reference for readers of all levels of understanding

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volume 41 of the prominent series modern aspects of electrochemistry covers a range of topics in electrochemistry and electrochemical engineering the topics include the second chapter on the survey of experimental techniques and devices of solid state electrochemistry begun by professor joachim maier in volume 39 chapter two contains a review of synthesis and characterization of nanoporous carbons and their electrochemical applications the next chapter reviews and discusses the use of graphs in the study of chemical reaction network the book also reviews and discusses mathematical models of three dimensional electrode structures

it is estimated that about 40 of the annual production of metals is used to repair or replace materials damaged by corrosion corrosion causes waste of the natural material and energy resources it creates serious materials problems for many technologies and adversely affects almost every area of engineering the use of metals in various aggressive environments has resulted in an extremely wide diversity of corrosion problems this book presents a collection of concise reviews written by experts in the field on selected topics of metallic corrosion and on some aspects of interaction of hydrogen with metals a comprehensive range of problems is examined including localized corrosion high temperature corrosion in liquid metals and molten salts transport control in corrosion processes entry of hydrogen into metals hydrogen embrittlement and hydrogen reactions with metals the variety of topics covered in the book will provide corrosion scientists engineers university lecturers and students alike with an interdisciplinary approach to solving problems of materials degradation and surface processes in metal corrosion

the only comprehensive two volume handbook on this important and rapidly developing topic combines fundamental information with a brief overview of recent advances in solid state electrochemistry primarily targeting specialists working in this scientific field particular attention is focused on the most important developments performed during the last decade methodological and theoretical aspects of solid state electrochemistry as well as practical applications the highly experienced editor has included chapters with critical reviews of theoretical approaches experimental methods and modeling techniques providing definitions and explaining relevant terminology as necessary several other chapters cover all the key groups of the ion conducting solids important for practice namely cationic protonic oxygen anionic and mixed conductors but also conducting polymer and hybrid materials finally the whole is rounded off by brief surveys of advances in the fields of fuel cells solid state batteries electrochemical sensors and other applications of ion conducting solids due to the very interdisciplinary nature of this topic this is of great interest to material scientists polymer chemists physicists and industrial scientists too

this book includes a detailed study on the electrochemical oxidation and corrosion of metals silver copper and their alloys in concentrated aqueous electrolytes solutions the properties of the electronic subsystem of the solid electrolyte and their effect on the electrode process are discussed as well in addition natural and synthesised porous materials are deemed as one of the most important object of study in major contemporary technologies the authors of this book analyse results of experimental researches revealing the regularities of high voltage electric discharges influence in solutions of surface active substances on the absorption processes moreover reaction dynamics at the passive film solution interface is an important subject from a theoretical and practical point of view in this book the relative importance of isovalent and oxidative dissolution is estimated as well as anion assisted solubilisation during oxidation of stainless alloys other chapters discuss non crystalline semiconductors crucial to a number of major technological notably in domains of electronic devices energy storage and converters and environmental monitoring such as batteries fuel cells and sensor technology the structure optical properties electronic and ionic conduction mechanisms of non crystalline semi conductors are explored as well

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Introduction

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