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Satoshi Horikoshi and Nick Serpone

Microwaves in Catalysis

Methodology and Applications



Microwaves Catalysis Applications Satoshi Horikoshi

Mehulkumar Patel



Microwaves Catalysis Applications Satoshi Horikoshi:

Microwaves in Catalysis Satoshi Horikoshi, Nick Serpone, 2015-12-14 A comprehensive overview covering the principles and preparation of catalysts as well as reactor technology and applications in the field of organic synthesis energy production and environmental catalysis Edited and authored by renowned and experienced scientists this reference focuses on successful reaction procedures for applications in industry Topics include catalyst preparation the treatment of waste water and air biomass and waste valorisation hydrogen production oil refining as well as organic synthesis in the presence of heterogeneous and homogeneous catalysts and continuous flow reactions With its practical relevance and successful methodologies this is a valuable guide for chemists at universities working in the field of catalysis organic synthesis pharmaceutical or green chemistry as well as researchers and engineers in the chemical industry

Microwave Chemical and Materials Processing Satoshi Horikoshi, Robert F. Schiffmann, Jun Fukushima, Nick Serpone, 2017-11-28 The principal aim of this book is to introduce chemists through a tutorial approach to the use of microwaves by examining several experiments of microwave chemistry and materials processing It will subsequently enable chemists to fashion their own experiments in microwave chemistry or materials processing Microwave heating has become a popular methodology in introducing thermal energy in chemical reactions and material processing in laboratory scale experiments Several research cases where microwave heating has been used in a wide range of fields have been reported including organic synthesis polymers nanomaterials biomaterials and ceramic sintering among others In most cases microwave equipment is used as a simple heat source Therefore the principal benefits of microwave radiation have seldom been taken advantage of One reason is the necessity to understand the nature of electromagnetism microwave engineering and thermodynamics However it is difficult for a chemist to appreciate these in a short time so they act as barriers for the chemist who might take an interest in the use of microwave radiation This book helps to overcome these barriers by using figures and diagrams instead of equations as much as possible

Microwaves in Nanoparticle Synthesis Satoshi Horikoshi, Nick Serpone, 2013-05-03 For the first time this comprehensive handbook presents the emerging field of microwave technology for the synthesis of nanoparticles Divided into three parts fundamentals methods and applications it covers topics including microwave theory scale up microwave plasma synthesis characterization and more This offers both an important volume for academic researchers and a resource for those in industry exploring the applications of nanoparticles in semiconductors electronics catalysis sensors and more

Agritech: Innovative Agriculture Using Microwaves and Plasmas Satoshi Horikoshi, Graham Brodie, Koichi Takaki, Nick Serpone, 2022-01-01 This book describes innovative agricultural methods using thermal and non thermal microwave or plasma energies Humans that were nomadic in the past can now stably obtain food by developing agriculture Cities were formed as a result of remarkable development Later chemicals were introduced to agriculture to stabilize the food supply further Natural products were initially used but various artificial compounds have been developed

for agriculture since the 1900s To further improve crop productivity and diversification gene recombination genetic engineering using biotechnology has progressed in recent years and continues to develop further However these technologies contain pesticide residues and pose safety risks The innovative new agriculture explained in this book is based on the use of microwaves and plasma that do not rely on chemicals and genetic modification This is one of the first books focusing on the agricultural usage of microwaves In addition it is a technical book that incorporates plasma into agriculture from this perspective The book covers microwaves and plasmas which are completely different fields Thus it will be attractive to many readers who want to acquaint themselves with these alternative technologies and implement them This book will be useful to a broad audience including researchers and technicians at Universities and practitioners in industries It is made accessible to readers across different fields by including abundant figures and by limiting the use of equations to the possible extent

Photocatalysis Pierre Pichat, 2018-10-01 This book is a printed edition of the Special Issue Photocatalysis that was published in *Molecules*

RF Power Semiconductor Generator Application in Heating and Energy Utilization Satoshi Horikoshi, Nick Serpone, 2020-03-26 This is a specialized book for researchers and technicians of universities and companies who are interested in the fundamentals of RF power semiconductors their applications and market penetration Looking around we see that products using vacuum tube technology are disappearing For example branch tube TVs have changed to liquid crystal TVs and fluorescent light have turned into LED The switch from vacuum tube technology to semiconductor technology has progressed remarkably At the same time high precision functionalization miniaturization and energy saving have advanced On the other hand there is a magnetron which is a vacuum tube device for generating microwaves However even this vacuum tube technology has come to be replaced by RF power semiconductor technology In the last few years the price of semiconductors has dropped sharply and its application to microwave heating and energy fields will proceed In some fields the transition from magnetron microwave oscillator to semiconductor microwave oscillator has already begun From now on this development will progress remarkably Although there are several technical books on electrical systems that explain RF power semiconductors there are no books yet based on users viewpoints on actual microwave heating and energy fields In particular none have been written about exact usage and practical cases to answer questions such as What are the advantages and disadvantages of RF power semiconductor oscillator What kind of field can be used and the difficulty of the market and application Based on these issues this book explains the RF power semiconductors from the user's point of view by covering a very wide range of fields

Functionalized Nanomaterials II Vineet Kumar, Praveen Guleria, Nandita Dasgupta, Shivendu Ranjan, 2021-04-06 The functionalization of nanomaterials provides them with some unique properties making the same nanomaterial amenable for various applications by simply manipulating functional components However functionalized nanomaterials also face some challenges along with some encouraging new applications in the future This book provides a detailed account of applications of the functionalization of nanomaterials This book can serve as a reference

book for scientific investigators including doctoral and post doctoral scholars and undergraduate and graduate students in context with the scope of applications of functionalized nanomaterials It also highlights recent advances challenges and opportunities in the application of nanomaterials This book will provide critical and comparative data for nanotechnologists It may also be beneficial for multidisciplinary researchers industry personnel journalists policy makers and the common public to understand the scope of functionalized nanomaterials in detail and in depth Features This book covers various applications of functionalized nanomaterials It discusses recent global research trends and future applications of functionalized nanomaterials It highlights the need for more rigorous regulatory frameworks for the safe use of functionalized nanomaterials It contains contributions from international experts and will be a valuable resource for researchers

High-Energy Chemistry and Processing in Liquids Yoshie Ishikawa,Takahiro Nakamura,Morihisa Saeki,Tadatake Sato,Teruki Sugiyama,Hiroyuki Wada,Tomoyuki Yatsushashi,2022-02-05 This book focuses on chemical reactions and processing under extreme conditions how materials react with highly concentrated active species and or in a very confined high temperature and high pressure volume Those ultimate reaction environments created by a focused laser beam discharges ion bombardments or microwaves provide characteristic nano and submicron sized products and functional nanostructures The book explores the chemistry and processing of metals and non metals as well as molecules that are strongly dependent on the energy deposition processes and character of the materials Descriptions of a wide range of topics are given from the perspective of a variety of research methodologies material preparations and applications The reader is led to consider and review how a high energy source interacts with materials and what the key factors are that determine the quality and quantity of nanoproducts and nano processing

Advances in Microwave-assisted Heterogeneous Catalysis Jianli Hu,Benjaram M. Reddy,2023-11-03 Historically the field of heterogeneous catalysis has focused on the design and optimisation of the catalytic materials However as these optimisations start to reach diminishing returns attention has turned to non conventional means for improving reaction conditions such as the use of ultrasound plasma electromagnetic heating and microwave heating Microwave assisted catalysis has been demonstrated to be useful in a wide range of applications including ammonia synthesis desulfurization and production of chemicals from biomass Advances in Microwave assisted Heterogeneous Catalysis begins with the basics of microwave heating and the role of microwaves in heterogeneous catalysis It goes on to cover the mechanisms of microwave specific reaction rate enhancement microwave assisted synthesis of porous nonporous and supported metal catalysts microwave augmented reactor technology and microwave induced catalysis The application of microwave assisted heterogeneous catalysis in various fields of energy conversion environmental remediation and bulk and specialty chemicals synthesis are also discussed making this a great reference for anyone involved in catalysis research

Microwave catalysis Janez Mavri,Urban Bren,Andrej Kržan,2008 **Microwave Enabled Synthesis of Carbon Based Materials with Controlled Structures** Mehulkumar Patel,2016 **Micro-wave Promoted Chemistry**

Emilie Jolibois, King's College London. Department of Chemistry, 2005 *The Application of Microwaves to Some Heterogeneously Catalysed Reactions*
Christopher J. Bool, 1997 **Studies on Heterogeneous Catalysis Using Microwave and Conventional Heating**
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