Power Supplies Of Magnetrons Modeling Simulation And Optimization User Guide Of The Code Matlab Simulink To Treat The Modeling Of A Hv Power Supplies For Industrial Micro Wave Generators

The efficient design of microwave food products and associated packaging materials for optimum food quality and safety requires knowledge of product dielectric properties and associated heating mechanisms, careful consideration of product geometry, knowledge of modern packaging and ingredient technologies, and application of computer simulation, statistics and experimental design. Integrated knowledge and efficient application of these tools is essential for those developing food products in this demanding field. Development of packaging and products for use in microwave ovens provides a focused and comprehensive review for developers. Part one discusses the principles of microwave heating and ovens, with an emphasis on the effect of food dielectric properties and geometry on heating uniformity and optimising the flavours and colours of microwave foods. Microwave packaging materials and design are discussed in Part two; chapters cover rigid packaging, susceptors and shielding. Product development, food, packaging and oven safety is the topic of Part three. Computer modelling of microwave products and active packaging is discussed in Part four. Written by a distinguished team of international contributors, Development of packaging and products for use in microwave ovens is a valuable resource for those in the food and packaging industries. Comprehensively reviews the principles of microwave heating and ovens assessing the effect of food dielectric properties on heating uniformity Thoroughly reviews microwave packaging materials and design including testing and regulatory issues Features a seven page section of colour diagrams to show heat distributions

This work develops in detail the modeling of a new generation of single-phase power supply for several magnetrons. The proposed study involves in the first step a modeling of a current high voltage single phase power supply for industrial microwaves generators with only one magnetron, the second step treats a new modeling of a new single phase high voltage power supply for industrial microwaves generators with two magnetrons. After, the third step develops the last same new modeling but in this time for a new single phase high voltage power supply for industrial microwaves generators with three magnetrons. In each power supply for each steps mentioned above, we treat the dimensioning of its new transformer with shunts from its modeling, the check of the process regulation of the current in each magnetron, and the study of the breakdown of magnetrons.

High Power Impulse Magnetron Sputtering: Fundamentals, Technologies, Challenges and Applications is an in-depth introduction to HiPIMS that emphasizes how this novel sputtering technique differs from conventional magnetron processes in terms of both discharge physics and the resulting thin film characteristics. Ionization of sputtered atoms is discussed in detail for various target materials. In addition, the role of self-sputtering, secondary electron emission and the importance of controlling the process gas dynamics, both inert and reactive gases, are examined in detail with an aim to generate stable HiPIMS processes. Lastly, the book also looks at how to characterize the HiPIMS discharge, including essential diagnostic equipment. Experimental results and simulations based on industrially relevant material systems are used to illustrate mechanisms controlling nucleation kinetics, column formation and microstructure evolution. Includes a comprehensive description of the HiPIMS process from fundamental physics to applications Provides a distinctive link between the process plasma and thin film communities Discusses the industrialization of HiPIMS and its real world applications

Gathering the proceedings of the 12th CHAOS2019 International Conference, this book highlights recent developments in nonlinear, dynamical and complex systems. The conference was intended to provide an essential forum for Scientists and Engineers to exchange ideas, methods, and techniques in the field of Nonlinear Dynamics, Chaos, Fractals and their applications in General Science and the Engineering Sciences. The respective chapters address key methods, empirical data and computer techniques, as well as major theoretical advances in the applied nonlinear field. Beyond showcasing the state of the art, the book will help academic and industrial researchers alike apply chaotic theory in their studies.

Nanotechnology can profoundly benefit our health, environment and everyday life. In order to make this a reality, both technological and theoretical advancements of the nanomaterial synthesis methods are needed. A nanoparticle is one of the fundamental building blocks in nanotechnology and this thesis describes the control of the nucleation, growth and oxidation of titanium particles produced in a pulsed plasma. It will be shown that by controlling the process conditions both the composition (oxidationstate) and size of the particles can be varied. The experimental results are supported by theoretical modeling. If processing conditions are chosen which give a high temperature in the nanoparticle growth environment, oxygen was found to be necessary in order to nucleate the nanoparticles. The two reasons for this are 1: the lower vapor pressure of a titanium oxide cluster compared to a titanium cluster, meaning a lower probability of evaporation, and 2: the ability of a cluster to cool down by ejecting an oxygen atom when an oxygen molecule condenses on its surface. When the oxygen gas flow was slightly increased, the nanoparticle yield and oxidation state increased. A further increase caused a decrease in particle yield which is attributed to a slight oxidation ofthe cathode. By varying the oxygen flow, it was possible to control the oxidation state of the nanoparticles without fully oxidizing the cathode. Pure titanium nanoparticles could not be produced in a high vacuum system because oxygen containing gases such as residual water vapour have a profound influence on nanoparticle yield and composition. In an ultrahigh vacuum system titanium nanoparticles without significantoxygen contamination were produced by reducing the temperature of the growth environment and increasing the pressure of an argon-helium gas mixture within whichthe nanoparticles grew. The dimer formation rate necessary for this is only achievable at higher pressures. After a dimer has formed, it needs to grow by colliding with a titanium atom followed by cooling by collisions with multiple buffer gas atoms. The condensation event heats up the cluster to a temperature much higher than the gas temperature, where it is during a short time susceptible to evaporation. When the clusters' internal energy has decreased by collisions with the gas to less than the energy required to evaporate a titanium atom, it is temporarily stable until the next condensation event occurs. The temperature difference by which the cluster has to cool down before it is temporarily stable is exactly as many kelvins as the gas temperature.The addition of helium was found to decrease the temperature of the gas, making it possible for nanoparticles of pure titanium to grow. The process window where this is possible was determined and the results presented opens up new possibilities to synthesize particles with a controlled contamination level and deposition rate.The size of the nanoparticles has been controlled by three means. The first is to change the electrical potential

around the growth zone, which allows for size (diameter) control in the order of 25 to 75 nm without influencing the oxygen content of the particles. The second means is by increasing the pressure which decreases the ambipolar diffusion rate of the ions resulting in a higher growth material density. By doing this, the particle size can be increased from 50 to 250 nm, however the oxygen content also increases with increasing pressure when this is done in a high vacuum system. The last means of size control was by adding a helium flow to the process where higher flows resulted in smaller nanoparticle sizes. When changing the pressure in high vacuum, the morphology of the nanoparticles could be controlled. At low pressures, highly faceted near spherical particles were produced. Increasing the pressure caused the formation of cubic particles which appear to ‘fracture’ at higher pressures. At the highest pressure investigated, the particles became poly-crystalline with a cauliflower shape and this morphology was attributed to a lowad atom mobility. The ability to control the size, morphology and composition of the nanoparticles determines the success of applying the process to manufacture devices. In related work presented in this thesis it is shown that 150-200 nm molybdenum particles with cauliflower morphology were found to scatter light in which made them useful in photovoltaic applications, and the size of titanium dioxide nanoparticles were found to influence the selectivity of graphene based gas sensors.

This book deals with the EM analysis of closed microwave cavities based on a three-dimensional FDTD method. The EM analysis is carried out for (i) rectangular microwave ovens and (ii) hybrid-cylindrical microwave autoclaves at 2.45 GHz. The field distribution is first estimated inside domestic rectangular ovens in xy-, yz-, and zx-plane. Further, the RF leakage from the oven door is determined to study the effect of leakage radiation on wireless communication at 2.45 GHz. Furthermore, the EM analysis of the autoclave is carried out based on 3D FDTD using staircase approximation. In order to show the capability of autoclaves (excited with five source) for curing the aerospace components and materials, the field distribution inside autoclave cavity is studied in presence of aerospace samples. The FDTD based modelling of oven and autoclave are explained with the appropriate expressions and illustrations.

Khaled Fazel Stefan Kaiser Digital Microwave Systems German Aerospace Center (DLR) Bosch Telecom GmbH Institute for Communications Technology D-71522 Backnang, Germany D-82234 Wessling, Germany In this last decade of this millennium the technique of multi-carrier transmission for wireless broadband multimedia applications has been receiving wide interests. Its first great success was in 1990 as it was selected in the European Digital Audio Broadcasting (DAB) standard. Its further prominent successes were in 1995 and 1998 as it was selected as modulation scheme in the European Digital Video Broadcasting (DVB-T) and in three broadband wireless indoor standards, namely ETSI-Hiperlan-II, American IEEE-802. 11 and Japanese MMAC, respectively. The benefits and success of multi-carrier (MC) modulation in one side and the flexibility offered by spread spectrum (SS) technique in other hand motivated many researchers to investigate the combination of both techniques, known as multi-carrier spread-spectrum (MC-SS). This combination benefits from the main advantages of both systems and offers high flexibility, high spectral efficiency, simple detection strategies, narrow band interference rejection capability, etc. . The basic principle of this combination is straightforward: The spreading is performed as direct SS (DS-SS) but instead of transmitting the chips over a single sequence carrier, several sub-carriers could be employed. As depicted in Figure 1, after spreading with assigned user specific code of processing gain G the frequency mapping and multi-carrier modulation is applied. In the receiver side after multi-carrier demodulation and frequency de-mapping, the corresponding detection algorithm will be performed.

The high voltage power supply for magnetron, used for the modular microwave generators in industrial applications, is a classical design. This system is composed of a single-phase high voltage transformer with shunts supplying a cell, composed of a capacitor and a diode, which doubles the voltage and stabilizes the current. In this case, the leakage fluxes in the magnetic shunts are of the same order in the primary and the secondary fluxes. In this work, a quadruple model of this leakage transformer is developed taking account the saturation phenomena and the stabilization of the magnetron current. From the model of the transformer we will define a strategy of optimization aims at restricting the study of the effect of simultaneous variation of pertinent parameters on the magnetron current. This will lead to find an optimized solution of the transformer. The later, with reduced volume, weight, and therefore cost, will make the power supply more economical.

Physics of Thin Films is one of the longest running continuing series in thin film science, consisting of 25 volumes since 1963. The series contains quality studies of the properties of various thin films materials and systems. In order to be able to reflect the development of today's science and to cover all modern aspects of thin films, the series, starting with Volume 20, has moved beyond the basic physics of thin films. It now addresses the most important aspects of both inorganic and organic thin films, in both their theoretical as well as technological aspects. Therefore, in order to reflect the modern technology-oriented problems, the title has been slightly modified from Physics of Thin Films to Thin Films. This volume, part of the Thin Films Series, has been wholly written by two authors instead of showcasing several edited manuscripts.

This document describes the design and development of a plug-in magnetron radio frequency power source for the model antenna pattern range facility, and gives instructions for its operation.

Written by international experts from industry, research centers, and academia, Mathematical Modeling of Food Processing discusses the physical and mathematical analysis of transport phenomena associated with food processing. The models presented describe many of the important physical and biological transformations that occur in food during proces

This reference explores the sources, characteristics, bioeffects, and health hazards of extremely low-frequency (ELF) fields and radio frequency radiation (RFR), analyzing current research as well as the latest epidemiological studies to assess potential risks associated with exposure and to develop effective safety guidelines. Compiles reports and investigations from four decades of study on the effect of nonionizing electromagnetic fields and radiation on human health Summarizing modern engineering approaches to control exposure, Electromagnetic Fields and Radiation discusses: EM interaction mechanisms in biological systems Explorations into the impact of EM fields on free radicals, cells, tissues, organs, whole organisms, and the population Regulatory standards in the United States, Canada, Europe, and Asia Pacific Evaluation of incident fields from various EM sources Measurement surveys for various sites including power lines, substations, mobile systems, cellular base stations, broadcast antennas, traffic radar devices, heating equipment, and other sources Dosimetry techniques for the determination of internal EM fields Conclusions reached by the Food and Drug Administration, World Health Organization, and other institutions

In this valuable work, all aspects of the reactive magnetron sputtering process, from the discharge up to the resulting thin film growth, are described in detail, allowing the reader to understand the complete process. Hence, this book gives necessary information for those who want to start with reactive magnetron sputtering, understand and investigate the technique, control their sputtering process and tune their existing process, obtaining the desired thin films.

"Integrates principles of electromagnetics, dielectrics, heat and moisture transfer, packaging, solid mechanics, fluid flow, food chemistry, and microbiology to provide a comprehensive overview of microwave processing in a single accessible source."

The first overview of this topic begins with some historical aspects and a survey of the principles of the gas aggregation method. The second part covers modifications of this method resulting in different specialized techniques, while the third discusses the post-growth treatment that can be applied to the nanoparticles. The whole is rounded off by a

review of future perspectives and the challenges facing the scientific and industrial communities. An excellent resource for anyone working with the synthesis of nanoparticles, both in academia and industry.

The aim of this book is to provide the needed basic knowledge to use the Matlab-Simulink software on a computer to simulate the modeling and optimization of a single-phase high voltage power supply for industrial microwave generators with N magnetrons 800 Watts-2450 MHz (treated cases N = 1 and N = 2). This original work will contribute to develop of research in the field of manufacturing technology of current single-phase power supplies, three-phase and future hexa-phase with the aim to keep the operating performance of these systems and obtain the following benefits: Reduction in the cost of producing the installation of the HV power supplies for magnetrons. Decrease the congestion, volume and cost of maintenance of these installations.

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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.