The Foundations of Vacuum Coating Technology

A coneise look at the discoveries, inventions, and people behind vacuum coating, past and present.



Donald M. Mattox



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The Foundations of Vacuum Coating Technology Donald M. Mattox, D. M. Mattox, 2003-04-16 The Foundations of Vacuum Coating Technology is a concise review of the developments that have led to the wide variety of applications of this technology This book is a must have for materials scientists and engineers working with vacuum coating in the invention of new technologies or applications in all industries With over 370 references this is an excellent starting point for those who don t want to reinvent the wheel In particular the book is a valuable reference for those interested in researching proposed or existing patents This unique book provides a starting point for more in depth surveys of past and recent work in all aspects of vacuum coating The author uses his extensive knowledge of the subject to draw comparisons and place the information into the proper context This is particularly important for the patent literature where the terminology does not always match industry jargon A section of acronyms for vacuum coating and glossary of terms at the end of the book are critical additions to the information every reader needs The Foundations of Vacuum Coating Technology Donald M. Mattox, 2014-03-12 Introduction 1 Early Vacuum Science and Technology 2 Early Electricity and Magnetism 5 Early Plasma Physics and Chemistry 7 Some Scientific and Engineering Societies and Publications 9 Patents and the U S Patent Office 10 Deposition Processes 11 Sputter Deposition 11 Thermal Evaporation 19 Arc Vapor Deposition 24 Chemical Vapor Deposition 27 Ion Plating 30 Surface Preparation 34 Summary 37 Endnotes 39 References 43 Acronyms Used in Vacuum Coating 61 Glossary of Terms for Vacuum Coating 69 The Foundations of Vacuum Coating Technology Introduction Vacuum coatings processes use a vacuum sub are combined in the same chamber at the same time to deposit the material in a hybrid process For atmospheric pressure environment and an atomic example the deposition of titanium carbonitride or molecular condensable vapor source to deposit thin films and coatings The vacuum environment is TiCxNy or Ti CN may be performed using a hy used not only to reduce gas particle density but also brid process where the titanium may come from sput to limit gaseous contamination establish partial pres tering titanium the nitrogen is from a gas and the sures of inert and reactive gases and control gas flow carbon is from acetylene vapor Alloys mixtures The vapor source may be from a solid or liquid sur compounds and composite materials can be depos face physical vapor deposition PVD or from a ited using a single source of the desired material or chemical vapor precursor chemical vapor deposi multiple sources of the constituents Foundations of Vacuum Coating Technology Donald M. Mattox, 2018-08-21 The Foundations of Vacuum Coating Technology Second Edition is a revised and expanded version of the first edition which was published in 2003 The book reviews the histories of the various vacuum coating technologies and expands on the history of the enabling technologies of vacuum technology plasma technology power supplies and low pressure plasma enhanced chemical vapor deposition The melding of these technologies has resulted in new processes and products that have greatly expanded the application of vacuum coatings for use in our everyday lives The book is unique in that it makes extensive reference to the patent literature

mostly US and how it relates to the history of vacuum coating The book includes a Historical Timeline of Vacuum Coating Technology and a Historical Timeline of Vacuum Plasma Technology as well as a Glossary of Terms used in the vacuum coating and surface engineering industries History and detailed descriptions of Vacuum Deposition Technologies Review of Enabling Technologies and their importance to current applications Extensively referenced text Patents are referenced as part of the history Historical Timelines for Vacuum Coating Technology and Vacuum Plasma Technology Glossary of Terms for vacuum coating

The Effect of UV Light and Weather Liesl K. Massey, 2006-09-07 This extensively updated comprehensive databook was created for design and application engineers scientists and material producer technical support and research and development personnel Important weathering characteristics and material properties of plastics and elastomers are presented in discussion tabular and graphical sections It provides a ready reference for comparing materials in the same family as well as materials in different families Data are presented on 80 major plastic and elastomer materials including biodegradable or organic polymers New to this edition the resin chapters each contain textual summary information including category general description and weathering properties detailing information of the material susceptibility or immunity to weathering including discussion of test results Extensive references are provided The resin chapter material supplier trade name product data are presented in graphical and tabular format with results normalized to SI units retaining the familiar format of the 1st edition and allowing easy comparison between materials and test conditions

Multilayer Nanostructured Wear-Resistant Coatings for Metal-Cutting Tools A.A. Vereschaka, S.N. Grigoriev, V.P. Tabakov, 2025-09-23 This work focuses on the properties of multilayer nanostructured wear resistant coatings for cutting tools It provides an extensive overview of modern methods and approaches to creating wear resistant coatings for cutting tools The authors present a wealth of experimental data and offer generalized theories useful not only in the development of metal cutting tools with coatings but also in the creation of nanostructured materials for various applications Discusses the development and operation of nanostructured coatings operating under conditions of high temperatures pressures and chemical effects Includes studies of coating properties during cutting using modern methods transmission and scanning electron microscopy Presents mathematical models that describe the process of coating deposition and the cutting process as stochastic processes for the modeling of which it is necessary to use methods of probability theory. This book is intended for engineering and technical workers as well as graduate students involved in the development of research on and practical application of methods for applying wear resistant coatings Functional Coatings for Biomedical, Energy, and Environmental Applications Raj K. Arya, George D. Verros, J. Paulo Davim, 2024-10-22 Understand functional coatings and their role in three key industries of the future Functional coatings play a huge range of roles in industries from automotive to aerospace to electronic and beyond They offer protection performance enhancement corrosion resistance self cleaning properties and more Recent developments in the field have allowed for ever more precise optimization of functional coatings

with the result that demand for these key tools is only likely to increase Functional Coatings for Biomedical Energy and Environmental Applications offers a comprehensive overview of these coatings and their applications in three explosively productive industries A team of expert contributors provides chapters analyzing the latest developments in this growing area of production with a particular focus on the dynamic relationship between functional coatings and their many applications The result is an interdisciplinary text which will serve as an essential resource for researchers and industry professionals worldwide Readers will also find Analysis of functional coatings for dental implants pool boilers solar cells and many more Detailed discussion of coating properties including superhydrophobicity self cleaning controlled drug release and more Key contributions to the great environmental challenges of the twenty first century This book is a must own for researchers in chemistry engineering energy materials science and more as well as for industry professionals working with coating and other aspects of research and development in biomedical energy or environmental industries Thin Film Coatings Fredrick Madaraka Mwema, Tien-Chien Jen, Lin Zhu, 2022-06-19 Thin Film Coatings Properties Deposition and Applications discusses the holistic subject of conventional and emerging thin film technologies without bias to a specific technology based on the existing literature It covers properties and delves into the various methods of thin film deposition including the most recent techniques and a direction for future developments It also discusses the cutting edge applications of thin film coatings such as self healing and smart coatings biomedical hybrid and scalable thin films Finally the concept of Industry 4 0 in thin film coating technology is examined This book Explores a wide range and is not specific to material and method of deposition Demonstrates the application of thin film coatings in nearly all sectors such as energy and anti microbial applications Details the preparation and properties of hybrid and scalable ultra thin materials for advanced applications Provides detailed bibliometric analyses on applications of thin film coatings Discusses Industry 4 0 and 3D printing in thin film technology With its broad coverage this comprehensive reference will appeal to a wide audience of materials scientists and engineers and others studying and developing advanced thin film technologies Nanomechanics for Coatings and Engineering Surfaces Ben Beake, Tomasz Liskiewicz, 2024-11-05 Nanomechanics for Coatings and Engineering Surfaces Test Methods Development Strategies Modeling Approaches and Applications provides readers with an array of best practices for nanoindentation measurements as well as related small scale test methods and how to translate test results into the development of improved coatings A core theme of the book is explaining to readers exactly how when and why the nanomechanical properties of engineered surfaces relate to their wear resistance The book starts with chapters that introduce the development and importance of nanomechanical testing and linkages between wear resistance and the mechanical properties of coatings before moving into discussions of various experimental methods and techniques such as nanoindentation continuous stiffness measurements nano scratch methods high temperature testing nano impact testing and more Other sections discuss modeling approaches such as finite element analysis atomistic and molecular dynamics and analytical methods Design

strategies and industrial applications are covered next with a final section looking at trends and future directions Provides best practices in nanoindentation measurements and related small scale test methods Demonstrates how to use test results to develop improved coatings Outlines modeling approaches and numerical simulations Highlights selected applications for metallic nanocomposites tribological coatings solid lubricants and aerospace coatings Shows future directions for simulation of complex wear scenarios Polymers Coatings Inamuddin, Rajender Boddula, Mohd Imran Ahamed, Abdullah M. Asiri,2020-05-27 The explores the cutting edge technology of polymer coatings It discusses fundamentals fabrication strategies characterization techniques and allied applications in fields such as corrosion food pharmaceutical biomedical systems and electronics It also discusses a few new innovative self healing antimicrobial and superhydrophobic polymer coatings Current industrial applications and possible potential activities are also discussed Production, Properties, and Applications of High Temperature Coatings Pakseresht, Amir Hossein, 2018-01-12 Heat resistant layers are meant to withstand high temperatures while also protecting against all types of corrosion and oxidation Therefore the micro structure and behavior of such layers is essential in understanding the functionality of these materials in order to make improvements Production Properties and Applications of High Temperature Coatings is a critical academic publication which examines the methods of creation characteristics and behavior of materials used in heat resistant layers Featuring coverage on a wide range of topics such as thermal spray methods sol gel coatings and surface nanoengineering this book is geared toward students academicians engineers and researchers seeking relevant research on the methodology and materials for producing effective heat resistant layers

Adopting the Melody of Term: An Mental Symphony within The Foundations Of Vacuum Coating Technology

In a global consumed by screens and the ceaseless chatter of quick transmission, the melodic elegance and mental symphony developed by the prepared term frequently fade in to the backdrop, eclipsed by the relentless sound and interruptions that permeate our lives. However, set within the pages of **The Foundations Of Vacuum Coating Technology** a stunning fictional value full of raw emotions, lies an immersive symphony waiting to be embraced. Crafted by a wonderful composer of language, that interesting masterpiece conducts viewers on an emotional journey, well unraveling the hidden songs and profound affect resonating within each cautiously crafted phrase. Within the depths of the moving evaluation, we shall investigate the book is central harmonies, analyze its enthralling publishing model, and surrender ourselves to the profound resonance that echoes in the depths of readers souls.

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