

Electromagnetic Interference Shielding Boards Produced

This book discusses the methods synthesizing various carbon materials, like graphite, carbon blacks, carbon fibers, carbon nanotubes, and graphene. It also details different functionalization and modification processes used to improve the properties of these materials and composites. From a geometrical–structural point of view, it examines different properties of the composites, such as mechanical, electrical, dielectric, thermal, rheological, morphological, spectroscopic, electronic, optical, and toxic, and describes the effects of carbon types and their geometrical structure on the properties and applications of composites.

As with other transportation methods, safety issues in aircraft can result in a total loss of life. Recently, the air transport industry has come under immense scrutiny after several deaths occurred due to aircraft design and airlines that allowed improperly inspected aircraft to fly. Spacecraft too have found errors in system software that could lead to catastrophic failure. It is imperative that the aviation and aerospace industries continue to revise and refine safety protocols from the construction and design of aircraft, to secure and improve aviation systems, and to test and inspect aircraft. The Research Anthology on Reliability and Safety in Aviation Systems, Spacecraft, and Air Transport is a vital reference source that examines the latest scholarly material on the use of adaptive and assistive technologies in aviation to establish clear guidelines for the design and implementation of such technologies to better serve the needs of both military and civilian pilots. It also covers new information technology use in aviation systems to streamline the cybersecurity, decision making, planning, and design

Read Online Electromagnetic Interference Shielding Boards Produced

processes within the aviation industry. Highlighting a range of topics such as air navigation systems, computer simulation, and airline operations, this multi-volume book is ideally designed for pilots, scientists, engineers, aviation operators, air traffic controllers, air crash investigators, teachers, academicians, researchers, and students.

Electromagnetic interference (EMI) shielding materials prevent the transmission of electromagnetic (EM) radiation by reflection and/or absorption or by suppression. Emerging nanomaterials can be used effectively for EMI shielding. This book explores all aspects of EMI materials and focuses on the most recent advances and trends in the synthesis, processing, and characterization of electromagnetic shielding materials. Fundamentals of shielding theory, the practice of electromagnetic field measuring techniques, some of the EMI standards, novel materials employed (like MXenes), and the application of these materials in various fields are discussed.

Features: Provides a fundamental overview of EMI shielding and its effects on the environment and other electronics.

Includes a comprehensive overview of the sources and effects of EM radiation. Explains the synthesis, characterization methods, and properties of materials used to protect against radiation. Gives insights into the physics of EMI shielding and its associated mechanisms. Examines the current state of the art and new challenges in this area. This book is aimed at researchers and engineers working in the fields of electromagnetic interference shielding, polymer science, materials science, nanotechnology, and other allied subject areas.

A comprehensive review of the field of materials that shield people and sensitive electronic devices from electromagnetic fields. Advanced Materials for Electromagnetic Shielding offers a thorough review of the most recent advances in the processing and characterization of the electromagnetic

Read Online Electromagnetic Interference Shielding Boards Produced

shielding materials. In this groundbreaking book, the authors—noted experts in the field—discuss the fundamentals of shielding theory as well as the practice of electromagnetic field measuring techniques and systems. They also explore applications of shielding materials used as absorbers of electromagnetic radiation, or as magnetic shields and explore coverage of new advanced materials for EMI shielding in aerospace applications. In addition, the text contains methods of preparation and applicability of metal foams. This comprehensive text examines the influence of technology on the micro-and macrostructure of polymers enabling their use in screening technology, technologies of shielding materials based on textiles, and analyses of its effectiveness in screening. The book also details the method of producing nanowires and their applications in EM shielding. This important resource: Explores the burgeoning market of electromagnetic shielding materials as we create, depend upon, and are exposed to more electronic devices than ever Addresses the most comprehensive issues relating to electromagnetic fields Contains information on the manufacturing, characterization methods, and properties of materials used to protect against them Discusses the important characterization techniques compared with one another, thus allowing scientists to select the best approach to a problem Written for materials scientists, electrical and electronics engineers, physicists, and industrial researchers, Advanced Materials for Electromagnetic Shielding explores all aspects in the area of electromagnetic shielding materials and examines the current state-of-the-art and new challenges in this rapidly growing area.

Expanded PTFE Applications Handbook: Technology, Manufacturing and Applications is a comprehensive guide to ePTFE, explaining manufacturing technologies, properties, and applications. Technologies that were previously shrouded

Read Online Electromagnetic Interference Shielding Boards Produced

in secrecy are revealed in detail, as are the origins and history of ePTFE. The book is an essential handbook for scientists and engineers working in PTFE processing industries, and for manufacturers working with fluoropolymers. It is also of use to purchasing managers and academics. Presents every aspect of the manufacturing technologies and properties of ePTFE Provides detailed coverage of ePTFE applications in apparel, medical, and surgical devices, filtration, vents, and industrial uses Follows ePTFE from its original discovery to the latest developments This book describes best practices for successful FPGA design. It is the result of the author's meetings with hundreds of customers on the challenges facing each of their FPGA design teams. By gaining an understanding into their design environments, processes, what works and what does not work, key areas of concern in implementing system designs have been identified and a recommended design methodology to overcome these challenges has been developed. This book's content has a strong focus on design teams that are spread across sites. The goal being to increase the productivity of FPGA design teams by establishing a common methodology across design teams; enabling the exchange of design blocks across teams. Coverage includes the complete FPGA design flow, from the basics to advanced techniques. This new edition has been enhanced to include new sections on System modeling, embedded design and high level design. The original sections on Design Environment, RTL design and timing closure have all been expanded to include more up to date techniques as well as providing more extensive scripts and RTL code that can be reused by readers. Presents complete, field-tested methodology for FPGA design, focused on reuse across design teams; Offers best practices for FPGA timing closure, in-system debug, and board design; Details techniques to

Read Online Electromagnetic Interference Shielding Boards Produced

resolve common pitfalls in designing with FPGAs.

Electronic and electric waste (e-waste), defined as end-of-life electronic products, including computers, television sets, mobile phones, transformers, capacitors, wires and cables, are a major global environmental concern. The crude recycling of e-waste releases persistent toxic substances, such as heavy metals, polybrominated diphenyl ethers (PBDEs), polychlorinated dibenzodioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), and the environmental pollution and health risks caused by the improper disposal of e-waste has become an urgent issue. This book offers an overview of e-waste history, sources, and entry routes in soil, air, water and sediment. It also addresses e-waste transport and fate, bioavailability and biomonitoring, e-waste risk assessment, impacts on the environment and public health. In addition, it discusses the impact of e-waste on soil microbial community diversity, structure and function and reviews the treatment and management strategies, such as bioremediation and phytoremediation, as well as policies and future challenges. Given its scope, it is a valuable resource for students, researchers and scholars in the field of electronics manufacturing, environmental science and engineering, toxicology, environmental biotechnology, soil sciences and microbial ecology,

Read Online Electromagnetic Interference Shielding Boards Produced

as well as and plant biotechnology.

An integrated, highly practical approach to product development using simultaneous engineering. Industrial engineers and designers as well as managers working on new product development (NPD) typically do not have the time or the expertise to get involved in functions outside their immediate area. Yet the very nature of NPD requires a number of functions and processes to be performed concurrently. This is where simultaneous engineering comes in. Simultaneous Engineering for New Product Development offers state-of-the-art, integrated coverage of these two hot topics in manufacturing. Industry expert Jack Ribbens draws on firsthand experience with the successful application of simultaneous engineering in the automotive industry, discussing how this approach can help streamline the entire development and production process, resulting in high-quality, competitive goods. He examines all phases of the process, devoting a chapter to each key element—from market research to design and engineering to manufacturing, selling, and customer service and support. And while most books on concurrent engineering stress the theoretical aspects of the field, Ribbens's book is decidedly practical, complete with case studies from the automotive, aerospace, heavy vehicle, and electronic industries that can be applied to any manufactured product. With

Read Online Electromagnetic Interference Shielding Boards Produced

mathematical model development as well as useful graphs, checklists, and references, Simultaneous Engineering for New Product Development will help manufacturing professionals take advantage of new trends and technologies in manufacturing well into the twenty-first century.

This book focuses on the chemistry of metallized and magnetic polymers, as well as the special applications of these materials. After an introductory section on the general aspects of the field, the types and uses of these polymers are detailed, followed by an overview of the testing methods. The book is divided equally into two parts – metallized polymers and magnetic polymers – and both parts follow the same structure: All methods of fabrication Properties and methods of measurement including standard test methods and interface properties Fields of applications Environmental issues including recycling and biodegradable polymers

This is an easily-accessible two-volume encyclopedia summarizing all the articles in the main volumes Kirk-Othmer Encyclopedia of Chemical Technology, Fifth Edition organized alphabetically. Written by prominent scholars from industry, academia, and research institutions, the Encyclopedia presents a wide scope of articles on chemical substances, properties, manufacturing, and uses; on industrial processes, unit operations in chemical engineering; and on fundamentals and

Read Online Electromagnetic Interference Shielding Boards Produced

scientific subjects related to the field.

With electromagnetic compliance (EMC) now a major factor in the design of all electronic products, it is crucial to understand how electromagnetic interference (EMI) shielding products are used in various industries. Focusing on the practicalities of this area, *Advanced Materials and Design for Electromagnetic Interference Shielding* comprehensively introduces the design guidelines, materials selection, characterization methodology, manufacturing technology, and future potential of EMI shielding. After an overview of EMI shielding theory and product design guidelines, the book extensively reviews the characterization methodology of EMI materials. Subsequent chapters focus on particular EMI shielding materials and component designs, including enclosures, metal-formed gaskets, conductive elastomer and flexible graphite components, conductive foam and ventilation structures, board-level shielding materials, composite materials and hybrid structures, absorber materials, grounding and cable-level shielding materials, and aerospace and nuclear shielding materials. The last chapter presents a perspective on future trends in EMI shielding materials and design. Offering detailed coverage on many important topics, this indispensable book illustrates the efficiency and reliability of a range of materials and design solutions for EMI shielding.

Read Online Electromagnetic Interference Shielding Boards Produced

This domain derives from such diverse disciplines as electronics, mechanical engineering, fluid dynamics, thermodynamics, chemistry, physics, metallurgy and optics. The author, with nearly four decades of experience in R&D, technology development, and education and training, provides a practical and hand-on approach to the subject, by covering the latest technological developments and covering all the vital aspects of PCB, i.e. design, fabrication, assembly, testing, including reliability and quality. With this coverage, the book will be useful to designers, manufacturers, and students of electrical and electronic engineering.

This book describes the rapidly expanding field of two-dimensional (2D) transition metal carbides and nitrides (MXenes). It covers fundamental knowledge on synthesis, structure, and properties of these new materials, and a description of their processing, scale-up and emerging applications. The ways in which the quickly expanding family of MXenes can outperform other novel nanomaterials in a variety of applications, spanning from energy storage and conversion to electronics; from water science to transportation; and in defense and medical applications, are discussed in detail.

In engineering, there are often situations in which the material of the main component is unable to sustain long life or protect itself from adverse operating environments. Moreover, in some cases, different material properties such as anti-friction and wear, anti-corrosive, thermal resistive, super hydrophobic, etc. are required as per the operating conditions. If those bulk components are made of such

Read Online Electromagnetic Interference Shielding Boards Produced

materials and possess those properties, the cost will be very high. In such cases, a practical solution is surface coating, which serves as a protective barrier to the bulk material from the adverse environment. In the last decade, with enormous effort, researchers and scientists have developed suitable materials to overcome those unfavorable operating conditions, and they have used advanced deposition techniques to enhance the adhesion and surface texturing of the coatings. *Advanced Surface Coating Techniques for Modern Industrial Applications* is a highly sought reference source that compiles the recent research trends in these new and emerging surface coating materials, deposition techniques, properties of coated materials, and their applications in various engineering and industrial fields. The book particularly focuses on 1) coating materials including anti-corrosive materials and nanomaterials, 2) coating methods including thermal spray and electroless disposition, and 3) applications such as surface engineering and thin film application. The book is ideal for engineers, scientists, researchers, academicians, and students working in fields like material science, mechanical engineering, tribology, chemical and corrosion science, bio-medical engineering, biomaterials, and aerospace engineering.

This handbook is a comprehensive guide to the selection and applications of copper and copper alloys, which constitute one of the largest and most diverse families of engineering materials. The handbook includes all of the essential information contained in the ASM Handbook series, as well as important reference information and data from a wide variety of ASM publications and industry sources.

The 'Architect's Bible' since 1932, updated with the latest codes and standards *Architectural Graphic Standards* is the written authority for architects, designers, and building contractors. It provides comprehensive guidance on the visual

Read Online Electromagnetic Interference Shielding Boards Produced

representation of materials, products, systems, and assemblies. Updated to reflect the most current codes and standards, this new 12th edition features over 300 new drawings, tables, and designs and twenty-five percent new content. In response to architects' feedback and overwhelming demand for a more graphics-heavy format, this edition employs shorter, more accessible texts and more images of the standards and evolution of design and construction. New coverage includes building resiliency and the building envelope, expert discussion on the fundamentals of design and construction documentation, and new examination of environmental factors and material properties and performance. Sustainable Design is no longer separated, but incorporated throughout, and extensive appendices keep useful data right at your fingertips. Graphic standards are essential to building design. They cover everything from door frames and roof designs to air ducts and outdoor sports facilities. This meticulous resource provides a compendium of planning standards, optimum dimensions, and normative construction details. The book is organized into three core sections covering: design and documentation, materials, and building elements. Architectural Graphic Standards features: Key architectural design and production processes—functional planning, environmental assessment, building resiliency, and architectural construction documentation Thorough coverage of materials: concrete, masonry, metals, wood, plastics, composites, and glass An exhaustive survey of building elements—substructures, shells, services, equipment, furnishings, special structures, and siteworks Comprehensive appendixes filled with pertinent data such as: classic architectural elements, mathematical data, and structural calculations Endorsed by the American Institute of Architects, this book has an enduring and unsurpassed reputation for high-quality illustration, text, and graphic design. For crucial

Read Online Electromagnetic Interference Shielding Boards Produced

information in a user-friendly format, Architectural Graphic Standards is the go-to reference on building design and construction.

Advanced Spinel Ferrite Nanocomposites for Electromagnetic Interference Shielding Applications presents recent developments in advanced spinel ferrite nanocomposites for electromagnetic interference shielding, including microwave absorption applications. The book includes the basics of shielding mechanisms, synthesis of advanced nanocomposites, and characterization, as well as results analysis. It also discusses the relationship between nanocomposite structure and physical properties. The book systematically explores how spinel ferrite nanoparticle composites are utilized with polymer, carbon source materials (carbon nanotube, graphene, etc.), metal nanoparticles, metal oxide nanoparticles, hard ferrite nanoparticles, glass, rubber, wood, fabrics/textiles, and cement/concrete in the development of advanced spinel ferrite nanocomposites for electromagnetic interference shielding application.

Academics, scientists, engineers, students, and industrial researchers will find this book beneficial. Provides an overview of recent developments on advanced spinel ferrite nanocomposites for electromagnetic interference shielding
Outlines fundamental concepts of electromagnetic shielding mechanisms in nanocomposites
Explores the design of a variety of nanocomposites, discussion on their structure and physical properties, used for electromagnetic shielding applications

Proper design of printed circuit boards can make the difference between a product passing emissions requirements during the first cycle or not. Traditional EMC design practices have been simply rule-based, that is, a list of rules-of-thumb are presented to the board designers to implement. When a particular rule-of-thumb is difficult to

Read Online Electromagnetic Interference Shielding Boards Produced

implement, it is often ignored. After the product is built, it will often fail emission requirements and various time consuming and costly add-ons are then required. Proper EMC design does not require advanced degrees from universities, nor does it require strenuous mathematics. It does require a basic understanding of the underlying principles of the potential causes of EMC emissions. With this basic understanding, circuit board designers can make trade-off decisions during the design phase to ensure optimum EMC design.

Consideration of these potential sources will allow the design to pass the emissions requirements the first time in the test laboratory. A number of other books have been published on EMC. Most are general books on EMC and do not focus on printed circuit board is intended to help EMC engineers and design design. This book engineers understand the potential sources of emissions and how to reduce, control, or eliminate these sources. This book is intended to be a 'hands-on' book, that is, designers should be able to apply the concepts in this book directly to their designs in the real-world.

Describes this process at it relates to the electronics industry, focusing on such areas as printed wiring boards, networking, automatic assembly, surface mount technology, tape automated bonding, bar coding, and electro-static discharge. Also studies the effects of group work ethics as a factor in In the aerospace industry, avoiding operating issues, especially in regard to space missions and satellite structures, is crucial. The vast majority of these issues can be traced to disturbances in the electromagnetic fields used. Electromagnetic Compatibility for Space Systems Design is a critical

Read Online Electromagnetic Interference Shielding Boards Produced

scholarly resource that examines the applications of electromagnetic compatibility and electromagnetic interference in the space industry. Featuring coverage on a wide range of topics, such as magnetometers, electromagnetic environmental effects, and electromagnetic shielding, this book is geared toward managers, engineers, and researchers seeking current research on the applications of electromagnetic technologies in the aerospace field.

The objective of this two-volume book is the systematic and comprehensive description of the most competitive time-domain computational methods for the efficient modeling and accurate solution of modern real-world EMC problems.

Intended to be self-contained, it performs a detailed presentation of all well-known algorithms, elucidating on their merits or weaknesses, and accompanies the theoretical content with a variety of applications.

Outlining the present volume, numerical investigations delve into printed circuit boards, monolithic microwave integrated circuits, radio frequency microelectromechanical systems as well as to the critical issues of electromagnetic interference, immunity, shielding, and signal integrity. Biomedical problems and EMC test facility characterizations are also thoroughly covered by means of diverse time-domain models and accurate implementations. Furthermore, the analysis covers

Read Online Electromagnetic Interference Shielding Boards Produced

the case of large-scale applications and electrostatic discharge problems, while special attention is drawn to the impact of contemporary materials in the EMC world, such as double negative metamaterials, bi-isotropic media, and several others. Table of Contents: Introduction / Printed Circuit Boards in EMC Structures / Electromagnetic Interference, Immunity, Shielding, and Signal Integrity / Bioelectromagnetic Problems: Human Exposure to Electromagnetic Fields / Time-Domain Characterization of EMC Test Facilities / Large-Scale EMC and Electrostatic Discharge Problems / Contemporary Material Modeling in EMC Applications

This thesis introduces a new modeling approach for efficient and accurate Electromagnetic Interference/Compatibility (EMI/EMC) analysis of electronic systems. Printed Circuit Boards' (PCB) radiated emissions were investigated by varying the number of apertures on a shield, changing the locations of partially shielded PCB traces, changing the locations of PCB interconnects, and moving EMI sources within a shielding enclosure. The issue with EMC modeling is that given the complexity of solving Maxwell's equations for a given PCB configuration, the best course for many engineers is to broadly follow design guidelines that are only true for a specific geometry for a specific solution frequency instead of solving Maxwell's equations for a given

Read Online Electromagnetic Interference Shielding Boards Produced

problem. There are cases where the complexity of the PCB design and integrated circuits (IC) is so extensive, that it is impractical to have an exact solution of Maxwell's equations (i.e., modeling a functioning populated server motherboard within a cavity). Typically, EMC revisions are made to PCB designs if the Device Under Test (DUT) does not pass regulation certification, which can be very costly and time consuming. This is one of many reasons why PCB designs are infrequently changed, or if they are changed, only small variations are made. In this thesis, it will be shown that Artificial Neural Networks (ANN) are capable of providing accurate, fast, and computationally light estimates for radiated emissions. One case study employs this computational tool to find an optimized location on a PCB for a trace interconnect. The significance of utilizing ANNs for optimization is that ANNs provide a fast and accurate tool for design as well as for estimating radiated emissions. However, given that ANNs are highly variable, many approaches to ANN creation are examined and evaluated for specific EMC examples. Since ANN models do not require detailed geometrical configurations of the PCB and cable structures under consideration, computational overhead requirements are significantly reduced as compared to electromagnetic and circuit tools. The robustness, efficiency, accuracy, and versatility of ANN models, as demonstrated in this thesis, are

Read Online Electromagnetic Interference Shielding Boards Produced

particularly useful in the electronics industry since most manufacturers prefer reusing circuits and PCB layouts in new products with minor modifications to the existing time-tested designs.

Materials for Potential EMI Shielding Applications:
Processing, Properties and Current Trends

extensively and comprehensively reviews materials for EMI shielding applications, ranging from the principles to possible applications and various types of shielding materials. The book provides a thorough introduction to electromagnetic interference, its effect on both the environment and other electronic items, various materials that are used for electromagnetic interference shielding applications, and its properties. It explains the mechanism behind EMI shielding, the methods by which EMI SE of a given material is estimated, and the different fabrication methods currently employed for fabricating EMI shielding materials. Final sections focus on the theoretical background of EMI shielding and shielding mechanisms. This theoretical background is extended to the physics of EMI shielding, wherein the physics behind mechanism of shielding is explained. Focuses on the different types of available EMI shielding, their applications, processing, characterization, and the mechanism behind their shielding Discusses how to incorporate EMI shielding with low cost, low density and high strength Provides an understanding and clarifies

Read Online Electromagnetic Interference Shielding Boards Produced

both elementary and practical problems relating to EMI shielding materials

The need for advanced thermal management materials in electronic packaging has been widely recognized as thermal challenges become barriers to the electronic industry's ability to provide continued improvements in device and system performance. With increased performance requirements for smaller, more capable, and more efficient electronic power devices, systems ranging from active electronically scanned radar arrays to web servers all require components that can dissipate heat efficiently. This requires that the materials have high capability of dissipating heat and maintaining compatibility with the die and electronic packaging. In response to critical needs, there have been revolutionary advances in thermal management materials and technologies for active and passive cooling that promise integrable and cost-effective thermal management solutions. This book meets the need for a comprehensive approach to advanced thermal management in electronic packaging, with coverage of the fundamentals of heat transfer, component design guidelines, materials selection and assessment, air, liquid, and thermoelectric cooling, characterization techniques and methodology, processing and manufacturing technology, balance between cost and performance, and application niches. The final chapter presents a

Read Online Electromagnetic Interference Shielding Boards Produced

roadmap and future perspective on developments in advanced thermal management materials for electronic packaging.

Wireless transceivers and transmitters radiate intentional and unintentional electromagnetic (EM) signals. The unintended emissions result from electric (E) and magnetic (H) fields surrounding the current carrying traces, wire and other conductors. To address the concern for cellular phone electromagnetic interference (EMI) to aircraft radios, a radiated emission measurement process for wireless handsets has been proposed. Spurious radiated emissions can be efficiently characterized from devices tested in either a semi-anechoic or reverberation chamber, in terms of effective isotropic radiated power. This report provides a detailed description of a proposal of the measurement process. Aircraft interference path loss (IPL) and navigation radio interference threshold data from numerous reference documents have been referred and proposed accordingly. Using this data, a preliminary risk assessment has been provided for wireless phone interference to aircraft localizer, Glideslope, VOR, and GPS radio receivers on typical transport airplanes. The report identifies where existing data for device emissions, IPL, and navigation radio interference thresholds needs to be extended for an accurate risk assessment for wireless transmitters in aircraft. In order to suppress

Read Online Electromagnetic Interference Shielding Boards Produced

these types of effects several techniques have been proposed. We hereby propose a new technique for suppression of radiated EMI which is very essential in present day context in the field of wireless communication. In our article we have proposed for board-level shielding and EMI gasketing for wireless communication system designs.

The goal of Interface Science and Composites is to facilitate the manufacture of technological materials with optimized properties on the basis of a comprehensive understanding of the molecular structure of interfaces and their resulting influence on composite materials processes. From the early development of composites of various natures, the optimization of the interface has been of major importance. While there are many reference books available on composites, few deal specifically with the science and mechanics of the interface of materials and composites. Further, many recent advances in composite interfaces are scattered across the literature and are here assembled in a readily accessible form, bringing together recent developments in the field, both from the materials science and mechanics perspective, in a single convenient volume. The central theme of the book is tailoring the interface science of composites to optimize the basic physical principles rather than on the use of materials and the mechanical performance and structural integrity of composites

Read Online Electromagnetic Interference Shielding Boards Produced

with enhanced strength/stiffness and fracture toughness (or specific fracture resistance). It also deals mainly with interfaces in advanced composites made from high-performance fibers, such as glass, carbon, aramid, and some inorganic fibers, and matrix materials encompassing polymers, carbon, metals/alloys, and ceramics. Includes chapter on the development of a nanolevel dispersion of graphene particles in a polymer matrix Focus on tailoring the interface science of composites to optimize the basic physical principles Covers mainly interfaces in advanced composites made from high performance fibers

[Copyright: 63e84704d11827519495320fb44ca1bc](https://doi.org/10.1002/9781118275194.ch20)