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Until comparatively recently, trace analysis techniques were in general directed toward the determination of impurities in bulk materials. Methods were developed for very high relative sensitivity, and the values determined were average values. Sampling procedures were devised which eliminated the so-called sampling error. However, in the last decade or so, a number of developments have shown that, for many purposes, the distribution of defects within a material can confer important new properties on the material. Perhaps the most striking example of this is given by semiconductors; a whole new industry has emerged in barely twenty years based entirely on the controlled distribution of defects within what a few years before would have been regarded as a pure, homogeneous crystal. Other examples exist in biochemistry, metallurgy, polymers and, of course, catalysis. In addition to this of the importance of distribution, there has also been a recognition growing awareness that physical defects are as important as chemical defects. (We are, of course, using the word defect to imply some discontinuity in the material, and not in any derogatory sense.) This broadening of the field of interest led the Materials Advisory Board(1} to recommend a new definition for the discipline, "Materials Character ization," to encompass this wider

concept of the determination of the structure and composition of materials. In characterizing a material, perhaps the most important special area of interest is the surface.

'In the second edition of Principles I have attempted to maintain the emphasis on basics, while updating the examples to include more recent results from the literature. There is a new chapter providing an overview of extrinsic fluorophores. The discussion of timeresolved measurements has been expanded to two chapters. Quenching has also been expanded in two chapters. Energy transfer and anisotropy have each been expanded to three chapters. There is also a new chapter on fluorescence sensing. To enhance the usefulness of this book as a textbook, most chapters are followed by a set of problems. Sections which describe advanced topics are indicated as such, to allow these sections to be skipped in an introduction course. Glossaries are provided for commonly used acronyms and mathematical symbols. For those wanting additional informtion, the final appendix contains a list of recommended books which expand on various specialized topics.'

from the author's Preface

It has long been claimed that addressing biodiversity loss and other environmental problems demands a better understanding of the social dimensions of conservation; nevertheless, the active participation of indigenous

peoples and local communities (IPLCs) in conservation initiatives is still a challenging and somehow controversial issue. In this context, this book hopes to give voice to other perspectives related to biodiversity conservation beyond the “fortress conservation” model and emphasize one of the pillars of democracy – popular participation. It covers a wide range of environments and issues of special significance to the topic, such as the expansion of culturally constructed niches, protected areas and food security, community-based management, participatory agroforestry, productive restoration and biocultural conservation. The contents also explore the limitations and shortcomings of participatory practices in protected areas, the relationship between the global crisis of democracy and the decline of biocultural diversity, as well as present current discussions on policy frameworks and governance systems for effective participatory biodiversity conservation. In sum, this book provides a comprehensive and realistic perspective on the social dimensions of conservation based on a series of interrelated themes in participatory biodiversity conservation. The connections between biocultural conservation and the current political and economic environment are highlighted through the chapters and the book closes with a debate on ways to reconcile human welfare, environmental justice and biodiversity conservation.

The Earth has limited material and energy resources. Further development of the humanity will require going beyond our planet for mining and use of extraterrestrial mineral resources and search of power sources. The exploitation of the natural resources of the Moon is a first natural step on this direction. Lunar materials may contribute to the betterment of conditions of people on Earth but they also may be used to establish permanent settlements on the Moon. This will allow developing new technologies, systems and flight operation techniques to continue space exploration. In fact, a new branch of human civilization could be established permanently on Moon in the next century. But, meantime, an inventory and proper social assessment of Moon's prospective energy and material resources is required. This book investigates the possibilities and limitations of various systems supplying manned bases on Moon with energy and other vital resources. The book collects together recent proposals and innovative options and solutions. It is a useful source of condensed information for specialists involved in current and impending Moon-related activities and a good starting point for young researchers.

This book summarizes recent developments in epoxy blends. It emphasizes new challenges for the synthesis, characterization, and properties of biofibers and biopolymers. It provides updates on all the important areas of biofibers and

biopolymers in a comprehensive fashion, including synthesis, processing, characterisation and application. It provides a one-stop reference for researchers and those working in industry and government. The book correlates macro, micro and nanostructure properties. Moreover, it provides cutting edge research from experts around the globe. The current status, trends, future directions and opportunities are discussed in detail, making the book also accessible for beginners to the subject and young researchers.

Each issue includes a classified section on the organization of the Dept. This book presents a dynamic history of the ways in which translators are trusted and distrusted. Working from this premise, the authors develop an approach to translation that speaks to historians of literature, language, culture, society, science, translation and interpreting. By examining theories of trust from sociological, philosophical, and historical studies, and with reference to interdisciplinarity, the authors outline a methodology for approaching translation history and intercultural mediation from three discrete, concurrent perspectives on trust and translation: the interpersonal, the institutional and the regime-enacted. This book will be of particular interest to students and scholars of translation studies, as well as historians working on mediation and cultural transfer.

Termination pay includes severance, mass redundancy, or end-of-service pay and is widely used as income protection for the unemployed. This book reviews such arrangements worldwide, analyzing their performance and recent reform trends to improve efficiency and redistributive impact.

Published on the occasion of Theodor Hänsch's 60th Birthday emphasis is placed on precision related to results in a variety of fields, such as atomic clocks, frequency standards, and the measurement of physical constants in atomic physics. Furthermore, illustrations and engineering applications of the fundamentals of quantum mechanics are widely covered. It has contributions by Nobel prize winners Norman F. Ramsey, Steven Chu, and Carl E. Wieman.

This book reviews the current status of semiconductor materials for conversion of sunlight to electricity, and highlights advances in both basic science and manufacturing. Photovoltaic (PV) solar electric technology will be a significant contributor to world energy supplies when reliable, efficient PV power products are manufactured in large volumes at low cost. Expert chapters cover the full range of semiconductor materials for solar-to-electricity conversion, from crystalline silicon and amorphous silicon to cadmium telluride, copper indium gallium sulfide selenides, dye sensitized solar cells, organic solar cells, and environmentally friendly copper zinc tin sulfide selenides. The latest methods for synthesis and characterization of solar cell materials are described, together with techniques for measuring solar cell efficiency. Semiconductor Materials

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for Solar Photovoltaic Cells presents the current state of the art as well as key details about future strategies to increase the efficiency and reduce costs, with particular focus on how to reduce the gap between laboratory scale efficiency and commercial module efficiency. This book will aid materials scientists and engineers in identifying research priorities to fulfill energy needs, and will also enable researchers to understand novel semiconductor materials that are emerging in the solar market. This integrated approach also gives science and engineering students a sense of the excitement and relevance of materials science in the development of novel semiconductor materials. · Provides a comprehensive introduction to solar PV cell materials · Reviews current and future status of solar cells with respect to cost and efficiency · Covers the full range of solar cell materials, from silicon and thin films to dye sensitized and organic solar cells · Offers an in-depth account of the semiconductor material strategies and directions for further research · Features detailed tables on the world leaders in efficiency demonstrations · Edited by scientists with experience in both research and industry

This book presents a technical review of ecological and life history information on a range of Bornean wildlife species, aimed at identifying what makes these species sensitive to timber harvesting practices and associated impacts. It addresses three audiences: 1) those involved in assessing and regulating timber harvesting activities in Southeast Asia, 2) those involved in trying to achieve conservation goals in the region, and 3) those undertaking research to improve multipurpose forest management. This

book shows that forest management can be improved in many simple ways to allow timber extraction and wildlife conservation to be more compatible than under current practices. The recommendations can also be valuable to the many governmental and non-governmental organisations promoting sustainable forest management and eco-labelling. Finally, it identifies a number of shortcomings and gaps in knowledge, which the hope can interest the scientific community and promote further research. This review is, an important scientific step toward understanding and improving sustainable forestry practices for long-term biodiversity conservation. Even in the short term, however, significant improvements can be made to improve both conservation and the efficiency of forest management, and there is no need to delay action due to a perceived lack of information. In the longer term it is expected that the recommendations from this review will be implemented, and that further research will continue to help foster an acceptable balance among the choices needed to maintain healthy wildlife populations and biodiversity in a productive forest estate.

The purpose of this Special Issue is to investigate topics related to sustainability issues in the new era, especially in Industry 4.0 or other new manufacturing environments. Under Industry 4.0, there have been great changes with respect to production processes, production planning and control, quality assurance, internal control, cost determination, and other management issues. Moreover, it is expected that Industry 4.0 can create positive sustainability impacts along the whole value chain. There are three

pillars of sustainability, including environmental sustainability, economic sustainability, and social sustainability. This Special Issue collects 15 sustainability-related papers from various industries that use various methods or models, such as mathematical programming, activity-based costing (ABC), material flow cost accounting, fuel consumption model, artificial intelligence (AI)-based fusion model, multi-attribute decision model (MADM), and so on. These papers are related to carbon emissions, carbon tax, Industry 4.0, economic sustainability, corporate social responsibility (CSR), etc. The research objects come from China, Taiwan, Thailand, Oman, Cyprus, Germany, Austria, and Portugal. Although the research presented in this Special Issue is not exhaustive, this Special Issue provides abundant, significant research related to environmental, economic, and social sustainability. Nevertheless, there still are many research topics that require our attention to solve problems of sustainability.

Global Warming: Causes, Impacts and Solutions covers all aspects of global warming including its causes, impacts, and engineering solutions. Energy and environment policies and strategies are scientifically discussed to expose the best ways to reduce global warming effects and protect the environment and energy sources affected by human activities. The importance of green energy consumption on the reduction of global warming, energy saving and energy security are also discussed. This book also focuses on energy management and conservation strategies for better utilization of energy sources and technologies in buildings and industry as well as ways of improving

energy efficiency at the end use, and introduces basic methods for designing and sizing cost-effective systems and determining whether it is economically efficient to invest in specific energy efficiency or renewable energy projects, and describes energy audit producers commonly used to improve the energy efficiency of residential and commercial buildings as well as industrial facilities. These features and more provide the tools necessary to reduce global warming and to improve energy management leading to higher energy efficiencies. In order to reduce the negative effects of global warming due to excessive use of fossil fuel technologies, the following alternative technologies are introduced from the engineering perspective: fuel cells, solar power generation technologies, energy recovery technologies, hydrogen energy technologies, wind energy technologies, geothermal energy technologies, and biomass energy technologies. These technologies are presented in detail and modeling studies including case studies can also be found in this book.

"Phase Change Materials: Science and Applications" provides a unique introduction of this rapidly developing field. Clearly written and well-structured, this volume describes the material science of these fascinating materials from a theoretical and experimental perspective. Readers will find an in-depth description of their existing and potential applications in optical and solid state storage devices as well as reconfigurable logic applications. Researchers, graduate students and scientists with an interest in this field will find "Phase Change Materials" to be a valuable reference.

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This series of comprehensive manuals gives the home mechanic an in-depth look at specific areas of auto repair.

Environmental illness: certain health professionals and clinical ecologists claim it impacts and inhibits 15 percent of the population. Its afflicted are led to believe environmental illness (EI) originates with food, chemicals, and other stimuli in their surroundings -as advocates call for drastic measures to remedy the situation. What if relief proves elusive-and the patient is sent on a course of ongoing, costly and ineffective "treatment"? Several hundred individuals who believed they were suffering from EI have been evaluated or treated by Herman Staudenmayer since the 1970s. Staudenmayer believed the symptoms harming his patients actually had psychophysiological origins-based more in fear of a hostile world than any suspected toxins contained in the environment. Staudenmayer's years of research, clinical work-and successful care-are now summarized in *Environmental Illness: Myth & Reality*. Dismissing much of the information that has attempted to defend EI and its culture of victimization, Staudenmayer details the alternative diagnoses and treatments that have helped patients recognize their true conditions-and finally overcome them, often after years of prolonged suffering.

This is a comprehensive tutorial on the emerging technology of free-space laser communications (FSLC). The book offers an all-inclusive source of information on the basics of FSLC, and a review of state-of-the-art technologies. Coverage includes atmospheric effects for laser propagation and FSLC systems performance and design. *Free-Space Laser Communications* is a valuable resource for engineers, scientists and students interested in laser communication systems designed for the atmospheric optical channel.

Sewage Treatment Plants: Economic Evaluation of Innovative Technologies for Energy

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Efficiency aims to show how cost saving can be achieved in sewage treatment plants through implementation of novel, energy efficient technologies or modification of the conventional, energy demanding treatment facilities towards the concept of energy streamlining. The book brings together knowledge from Engineering, Economics, Utility Management and Practice and helps to provide a better understanding of the real economic value with methodologies and practices about innovative energy technologies and policies in sewage treatment plants.

An introduction to RF propagation that spans all wireless applications This book provides readers with a solid understanding of the concepts involved in the propagation of electromagnetic waves and of the commonly used modeling techniques. While many books cover RF propagation, most are geared to cellular telephone systems and, therefore, are limited in scope. This title is comprehensive- it treats the growing number of wireless applications that range well beyond the mobile telecommunications industry, including radar and satellite communications. The author's straightforward, clear style makes it easy for readers to gain the necessary background in electromagnetics, communication theory, and probability, so they can advance to propagation models for near-earth, indoor, and earth-space propagation.

Critical topics that readers would otherwise have to search a number of resources to find are included:

- * RF safety chapter provides a concise presentation of FCC recommendations, including application examples, and prepares readers to work with real-world propagating systems
- * Antenna chapter provides an introduction to a wide variety of antennas and techniques for antenna analysis, including a detailed treatment of antenna polarization and axial ratio; the chapter contains a set of curves that permit readers to estimate polarization loss due to axial ratio mismatch between transmitting and receiving antennas without performing

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detailed calculations * Atmospheric effects chapter provides curves of typical atmospheric loss, so that expected loss can be determined easily * Rain attenuation chapter features a summary of how to apply the ITU and Crane rain models * Satellite communication chapter provides the details of earth-space propagation analysis including rain attenuation, atmospheric absorption, path length determination and noise temperature determination Examples of widely used models provide all the details and information needed to allow readers to apply the models with confidence. References, provided throughout the book, enable readers to explore particular topics in greater depth. Additionally, an accompanying Wiley ftp site provides supporting MathCad files for select figures in the book. With its emphasis on fundamentals, detailed examples, and comprehensive coverage of models and applications, this is an excellent text for upper-level undergraduate or graduate students, or for the practicing engineer who needs to develop an understanding of propagation phenomena.

This revised second edition is improved linguistically with multiple increases of the number of figures and the inclusion of several novel chapters such as actin filaments during matrix invasion, microtubuli during migration and matrix invasion, nuclear deformability during migration and matrix invasion, and the active role of the tumor stroma in regulating cell invasion.

This Open Access handbook published at the IAMG's 50th anniversary, presents a compilation of invited path-breaking research contributions by award-winning geoscientists who have been instrumental in shaping the IAMG. It contains 45 chapters that are categorized broadly into five parts (i) theory, (ii) general applications, (iii) exploration and resource estimation, (iv) reviews, and (v) reminiscences covering related topics like mathematical geosciences, mathematical

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morphology, geostatistics, fractals and multifractals, spatial statistics, multipoint geostatistics, compositional data analysis, informatics, geocomputation, numerical methods, and chaos theory in the geosciences.

While the concept of sustainability has been widely embraced, it has been only vaguely defined and is exceedingly difficult to measure. Sustainability indicators are critical to making the broad concept of sustainability operational by providing specific measures by which decision makers and the public can judge progress. Sustainability Indicators defines the present state of the art in indicator development. It presents a comprehensive assessment of the science behind various indicators, while placing special emphasis on their use as communications tools. The contributors draw on their experience as academics and practitioners to describe the conceptual challenges to measuring something as complex as sustainability at local, regional, national, and global scales. The book also reviews existing indicators to assess how they could be better employed, considering which indicators are overused and which have been underutilized. Sustainability Indicators will help planners and policy makers find indicators that are ready for application and relevant to their needs, and will help researchers identify the unresolved issues where progress is most urgently needed. All readers will find advice as to the most effective ways to use indicators to support decision making.

Sustainability covers environmental, social and economic dimensions, and requires a

multi-disciplinary approach in order to examine, explore and critically engage with issues and advances in its related areas. As we are aware, climate change is a certainty and it affects many economic sectors, including agriculture, particularly production of crop and livestock enterprises. Vast regional differences in these impacts are expected for various parts of the world, culminating in changes in trade patterns, and perhaps eventually even threatening the food security in certain parts of the world. Agricultural sustainability may be especially threatened by climate extremes, such as heat waves, droughts, and floods. However, not all changes induced by climate change would be negative; some may even be positive. Undoubtedly, there would be winners and losers within a nation, as well as among countries. Achieving sustainability would require changes in the way we manage agriculture. Equally important in this discourse is to find solutions to achieve sustainability in the wake of climate change, one of the major threats to sustainability. This book is devoted to various aspect of sustainable agriculture and climate change and their interplay.

Nano drug-delivery systems responding to cellular local stimuli, such as pH, temperature and reductive agent's activation, i.e. enzymes, could effectively provide passive-mode desirable release but fail in disease treatment following the biological rhythms of brain tumor. This book is a compilation of research development lead by expert researchers and it establishes a single reference module. It addresses, for the first time, all translational aspects and clinical perspectives of physically stimulated

breast-cancer nanotheranostics from a wide-ranging and multidisciplinary perception providing unrivalled and comprehensive knowledge in the field.

The increasing demands for internal combustion engines with regard to fuel consumption, emissions and driveability lead to more actuators, sensors and complex control functions. A systematic implementation of the electronic control systems requires mathematical models from basic design through simulation to calibration. The book treats physically-based as well as models based experimentally on test benches for gasoline (spark ignition) and diesel (compression ignition) engines and uses them for the design of the different control functions. The main topics are: - Development steps for engine control - Stationary and dynamic experimental modeling - Physical models of intake, combustion, mechanical system, turbocharger, exhaust, cooling, lubrication, drive train - Engine control structures, hardware, software, actuators, sensors, fuel supply, injection system, camshaft - Engine control methods, static and dynamic feedforward and feedback control, calibration and optimization, HiL, RCP, control software development - Control of gasoline engines, control of air/fuel, ignition, knock, idle, coolant, adaptive control functions - Control of diesel engines, combustion models, air flow and exhaust recirculation control, combustion-pressure-based control (HCCI), optimization of feedforward and feedback control, smoke limitation and emission control This book is an introduction to electronic engine management with many practical examples, measurements and research results. It is aimed at advanced

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students of electrical, mechanical, mechatronic and control engineering and at practicing engineers in the field of combustion engine and automotive engineering. This book comprises select proceedings of the International Conference on Future Learning Aspects of Mechanical Engineering (FLAME 2018). The book discusses different topics of industrial and production engineering such as sustainable manufacturing systems, computer-aided engineering, rapid prototyping, manufacturing management and automation, metrology, manufacturing process optimization, casting, welding, machining, and machine tools. The contents of this book will be useful for researchers as well as professionals.

When people or computers need to make a decision, typically multiple conflicting criteria need to be evaluated; for example, when we buy a car, we need to consider safety, cost and comfort. Multiple criteria decision making (MCDM) has been researched for decades. Now as the rising trend of big-data analytics in supporting decision making, MCDM can be more powerful when combined with state-of-the-art analytics and machine learning. In this book, the authors introduce a new framework of MCDM, which can lead to more accurate decision making. Several real-world cases will be included to illustrate the new hybrid approaches.

Thoroughly updated for new breakthroughs in multimedia; The internationally bestselling *Multimedia: Making it Work* has been fully revised and expanded to cover the latest technological advances in multimedia. You will learn to plan and manage

multimedia projects, from dynamic CD-ROMs and DVDs to professional websites. Each chapter includes step-by-step instructions, full-color illustrations and screenshots, self-quizzes, and hands-on projects. nbsp;

As the most powerful explosion that occurs in the universe, gamma-ray bursts (GRBs) are one of the most exciting topics being studied in astrophysics. Creating more energy than the Sun does in its entire lifetime, GRBs create a blaze of light that will outshine every other object visible in the sky, enabling us to measure galaxies that are several million years old. GRBs cover various areas of astronomy and interest in them reaches a wide range of fields. Andrew Levan explores the fascinating history of these astronomical occurrences and details our current understanding of GRBs. The science behind them is rapidly moving and this book examines the knowledge that we now have as well as the questions that are continually being raised. Predominantly aimed at PhD students and researchers in the area, Gamma-Ray Bursts addresses this captivating topic and outlines the principles and initial applications of a fascinating astronomical phenomena.

This new edition of the bestselling Measurement, Instrumentation, and Sensors Handbook brings together all aspects of the design and implementation of measurement, instrumentation, and sensors. Reflecting the current state of the art, it describes the use of instruments and techniques for performing practical measurements in engineering, physics, chemistry, and the life sciences; explains

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sensors and the associated hardware and software; and discusses processing systems, automatic data acquisition, reduction and analysis, operation characteristics, accuracy, errors, calibrations, and the incorporation of standards for control purposes. Organized according to measurement problem, the Second Edition: Consists of 2 volumes Features contributions from 240+ field experts Contains 53 new chapters, plus updates to all 194 existing chapters Addresses different ways of making measurements for given variables Emphasizes modern intelligent instruments and techniques, human factors, modern display methods, instrument networks, and virtual instruments Explains modern wireless techniques, sensors, measurements, and applications A concise and useful reference for engineers, scientists, academic faculty, students, designers, managers, and industry professionals involved in instrumentation and measurement research and development, Measurement, Instrumentation, and Sensors Handbook, Second Edition provides readers with a greater understanding of advanced applications.

Biodegradable and Biocompatible Polymer Composites: Processing, Properties and Applications begins by discussing the current state-of-the-art, new challenges and opportunities for various biodegradable and biocompatible polymer composite systems. Interfacial characterization of composites and the structure-property relationships in various composite systems are explained in detail via a theoretical model. Processing techniques for various macro and nanocomposite systems and the influence of

processing parameters on properties of the composite are also reviewed in detail. The characterization of microstructure, elastic, visco-elastic, static and dynamic mechanical, thermal, rheological, optical, and electrical properties are highlighted, as are a broad range of applications. The book is a useful reference resource for both researchers and engineers working in composites materials science, biotechnology and nanotechnology, and is also useful for students attending chemistry, physics, and materials science and engineering courses. Presents recent outcomes and highlights the going importance of biodegradable and biocompatible polymer composites and their impact on the environment Analyzes all the main processing techniques, characterization and applications of biodegradable composites Written by leading international experts working in the field of biodegradable and biocompatible polymer composites Covers a broad range of application fields, including medical and pharmaceutical, agricultural, packaging and transport

This book provides a state-of-art overview of the significant advances in understanding the impacts of wind energy on wildlife. However, many challenges remain regarding planning and policy, assessment of direct and indirect effects on wildlife, methodological approaches, technology development, and mitigation strategies and their effectiveness. The book comprises a selection of the best contributions presented at the 4th Conference on Wind energy and Wildlife impacts, held in Estoril, Portugal, 2017. The contents promote the international cooperation among researchers,

