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KEY=AND - SAWYER MOON

Surface Engineering of Light Alloys Aluminium, Magnesium and Titanium Alloys Elsevier The growing use of light alloys in industries such as aerospace, sports equipment and biomedical devices is driving research into surface engineering technologies to enhance their properties for the desired end use. Surface engineering of light alloys: Aluminium, magnesium and titanium alloys provides a comprehensive review of the latest technologies for modifying the surfaces of light alloys to improve their corrosion, wear and tribological properties. Part one discusses surface degradation of light alloys with chapters on corrosion behaviour of magnesium alloys and protection techniques, wear properties of aluminium-based alloys and tribological behaviour of titanium alloys. Part two reviews surface engineering technologies for light alloys including anodising, plasma electrolytic oxidation, thermal spraying, cold spraying, physical vapour deposition, plasma assisted surface treatment, PIII/PSII treatments, laser surface modification, ceramic conversion and duplex treatments. Part three covers applications for surface engineered light alloys including sports equipment, biomedical devices and plasma electrolytic oxidation and anodised aluminium alloys for spacecraft applications. With its distinguished editor and international team of contributors, Surface engineering of light alloys: Aluminium, magnesium and titanium alloys is a standard reference for engineers, metallurgists and materials scientists looking for a comprehensive source of information on surface engineering of aluminium, magnesium and titanium alloys. Discusses surface degradation of light alloys considering corrosion behaviour and wear and tribological properties Examines surface engineering technologies and modification featuring plasma electrolytic oxidation treatments and both thermal and cold spraying Reviews applications for engineered light alloys in sports equipment, biomedical devices and spacecraft **Hydrometallurgy Principles and Applications** Elsevier This book is concerned with the theoretical principles of hydrometallurgical processes and engineering aspects. The hydrometallurgical processes of production of copper are discussed and leaching of chalcopyrite as the main sulphide mineral of copper processed in industry is used as an example. The book is suitable as a university textbook for students of metallurgy. Examines the different techniques involved Discusses the production of specific metals using hydrometallurgical processes Looks at the future of hydrometallurgy **Nickel and Chromium Plating** Butterworth-Heinemann Nickel and Chromium Plating, Second Edition, does not merely update the first edition but also places additional emphasis on certain methods that have achieved increased industrial use in the 14 years since the first edition was published. The book begins by tracing the history of nickel and chromium plating. This is followed by a discussion of the electrochemistry of electrodeposition from aqueous electrolyte solutions. Separate chapters cover topics such as autocatalytic (electroless) nickel deposition; nickel plating onto aluminum and other difficult substrates; plating onto plastics and high-speed plating; the deposition of various nickel alloys for decorative and functional applications; composite coatings; and tampon (brush) plating. This book will be helpful to those new to the plating industry; those experienced in the industry will find that this revised version enables them to keep up-to-date with the latest developments in this specialized technology. **Stress Corrosion Cracking Theory and Practice** Elsevier The problem of stress corrosion cracking (SCC), which causes sudden failure of metals and other materials subjected to stress in corrosive environment(s), has a significant impact on a number of sectors including the oil and gas industries and nuclear power production. Stress corrosion cracking reviews the fundamentals of the phenomenon as well as examining stress corrosion behaviour in specific materials and particular industries. The book is divided into four parts. Part one covers the mechanisms of SCC and hydrogen embrittlement, while the focus of part two is on methods of testing for SCC in metals. Chapters in part three each review the phenomenon with reference to a specific material, with a variety of metals, alloys and composites discussed, including steels, titanium alloys and polymer composites. In part four, the effect of SCC in various industries is examined, with chapters covering subjects such as aerospace engineering, nuclear reactors, utilities and pipelines. With its distinguished editors and international team of contributors, Stress corrosion cracking is an essential reference for engineers and designers working with metals, alloys and polymers, and will be an invaluable tool for any industries in which metallic components are exposed to tension, corrosive environments at ambient and high temperatures. Examines the mechanisms of stress corrosion cracking (SCC) presenting recognising testing methods and materials resistant to SCC Assesses the effect of SCC on particular metals featuring steel, stainless steel, nickel-based alloys, magnesium alloys, copper-based alloys and welds in steels Reviews the monitoring and management of SCC and the affect of SCC in different industries such as petrochemical and aerospace **Fundamentals of Metallurgy** Elsevier As

product specifications become more demanding, manufacturers require steel with ever more specific functional properties. As a result, there has been a wealth of research on how those properties emerge during steelmaking. *Fundamentals of metallurgy* summarises this research and its implications for manufacturers. The first part of the book reviews the effects of processing on the properties of metals with a range of chapters on such phenomena as phase transformations, types of kinetic reaction, transport and interfacial phenomena. Authors discuss how these processes and the resulting properties of metals can be modelled and predicted. Part two discusses the implications of this research for improving steelmaking and steel properties. With its distinguished editor and international team of contributors, *Fundamentals of metallurgy* is an invaluable reference for steelmakers and manufacturers requiring high-performance steels in such areas as automotive and aerospace engineering. It will also be useful for those dealing with non-ferrous metals and alloys, material designers for functional materials, environmentalists and above all, high technology industries designing processes towards materials with tailored properties. Summarises key research and its implications for manufacturers

Essential reading for steelmakers and manufacturers Written by leading experts from both industry and academia **Iron Ore Mineralogy, Processing and Environmental Sustainability** Woodhead Publishing *Iron Ore: Mineralogy, Processing and Environmental Sustainability, Second Edition* covers all aspects surrounding the second most important commodity behind oil. As an essential input for the production of crude steel, iron ore feeds the world's largest trillion-dollar-a-year metal market and is the backbone of the global infrastructure. The book explores new ore types and the development of more efficient processes/technologies to minimize environmental footprints. This new edition includes all new case studies and technologies, along with new chapters on the chemical analysis of iron ore, thermal and dry beneficiation of iron ore, and discussions of alternative iron making technologies. In addition, information on recycling solid wastes and P-bearing slag generated in steel mills, sustainable mining, and low emission iron making technologies from regional perspectives, particularly Europe and Japan, are included. This work will be a valuable resource for anyone involved in the iron ore industry. Provides an overall view of the entire value chain, from iron ore to metal Includes specific information on process/stage/operation in the value chain Discusses challenges and developments, along with future trends in the iron ore and steel industries Incorporates new, sustainable mining techniques **Surface Engineering Casebook Solutions to Corrosion and Wear-Related Failures** Elsevier This book concisely and uniquely encompasses the principles of corrosion and wear as manifested in industrial failures and the solutions offered by surface engineering. **Sintering of Advanced Materials** Elsevier Sintering is a method for manufacturing components from ceramic or metal powders by heating the powder until the particles adhere to form the component required. The resulting products are characterised by an enhanced density and strength, and are used in a wide range of industries. *Sintering of advanced materials: fundamentals and processes* reviews important developments in this technology and its applications Part one discusses the fundamentals of sintering with chapters on topics such as the thermodynamics of sintering, kinetics and mechanisms of densification, the kinetics of microstructural change and liquid phase sintering. Part two reviews advanced sintering processes including atmospheric sintering, vacuum sintering, microwave sintering, field/current assisted sintering and photonic sintering. Finally, Part three covers sintering of aluminium, titanium and their alloys, refractory metals, ultrahard materials, thin films, ultrafine and nanosized particles for advanced materials. With its distinguished editor and international team of contributors, *Sintering of advanced materials: fundamentals and processes* reviews the latest advances in sintering and is a standard reference for researchers and engineers involved in the processing of ceramics, powder metallurgy, net-shape manufacturing and those using advanced materials in such sectors as electronics, automotive and aerospace engineering. Explores the thermodynamics of sintering including sinter bonding and densification Chapters review a variety of sintering methods including atmosphere, vacuum, liquid phase and microwave sintering Discusses sintering of a variety of materials featuring refractory metals, super hard materials and functionally graded materials **Advances in Powder Metallurgy Properties, Processing and Applications** Elsevier Powder metallurgy (PM) is a popular metal forming technology used to produce dense and precision components. Different powder and component forming routes can be used to create an end product with specific properties for a particular application or industry. *Advances in powder metallurgy* explores a range of materials and techniques used for powder metallurgy and the use of this technology across a variety of application areas. Part one discusses the forming and shaping of metal powders and includes chapters on atomisation techniques, electrolysis and plasma synthesis of metallic nanopowders. Part two goes on to highlight specific materials and their properties including advanced powdered steel alloys, porous metals and titanium alloys. Part three reviews the manufacture and densification of PM components and explores joining techniques, process optimisation in powder component manufacturing and non-destructive evaluation of PM parts. Finally, part four focusses on the applications of PM in the automotive industry and the use of PM in the production of cutting tools and biomaterials. *Advances in powder metallurgy* is a standard reference for structural engineers and component manufacturers in the metal forming industry, professionals working in industries that use PM components and academics with a research interest in the field. Discusses the forming and shaping of metal powders and includes chapters on atomisation techniques Highlights specific materials and their properties including advanced powdered steel alloys, porous metals and titanium alloys Reviews the manufacture and densification of PM components and explores joining techniques **Techniques for Corrosion Monitoring** Elsevier Corrosion monitoring techniques play a key role in efforts to combat corrosion, which can have major economic and safety implications. This important book starts with a review of corrosion fundamentals and provides a four-part comprehensive analysis of a wide range of methods for corrosion monitoring, including practical applications and case studies. The first part of the book reviews electrochemical techniques for corrosion monitoring, such as polarization techniques, potentiometric methods, electrochemical noise and harmonic analyses, galvanic sensors, differential flow through cells and multielectrode systems. A second group of chapters analyses the physical or chemical methods of corrosion monitoring. These include gravimetric, radioactive tracer, hydrogen permeation, electrical resistance and rotating cage techniques. Part II also includes a chapter on the innovative nondestructive evaluation technologies that can be used to monitor corrosion. Part III examines corrosion monitoring in special environments such as microbial systems, concrete and soil, and remote monitoring and model predictions. A final group of chapters includes various case studies covering ways in which corrosion monitoring can be applied to engine exhaust systems, cooling water systems, pipelines, equipment in chemical plants, and other real world systems. With its distinguished editor and international team of contributors, *Techniques for corrosion monitoring* is a valuable reference guide for engineers and scientific and technical personnel who deal with corrosion in such areas as automotive engineering, power generation, water suppliers and the petrochemical industry. Provides a comprehensive analysis of the range of techniques for corrosion

monitoring Specific case studies are included to highlight the main issues A valuable reference guide for engineers, scientific and technical personnel who deal with corrosion **Handbook of Gold Exploration and Evaluation** Elsevier Designed for geologists and engineers engaged specifically in the search for gold deposits of all types and as a reference for academics in higher schools of learning, Handbook of gold exploration and evaluation provides principles and detailed explanations that underpin the correct interpretation of day-to-day experience in the field. Problems are addressed with regard to the analysis, interpretation and understanding of the general framework within which both primary and secondary gold resources are explored, developed and exploited. Handbook of gold exploration and evaluation covers a comprehensive range of topics including the nature and history of gold, geology of gold ore deposits, gold deposition in the weathering environment, sedimentation and detrital gold, gold exploration, lateritic and placer gold sampling, mine planning and practise for shallow deposits, metallurgical processes and design, and evaluation, risk and feasibility. Covers the nature and history of gold Addresses problems with regard to the framework in which gold resources are explored, developed and exploited Discusses topics including the geology of gold ore deposits, metallurgical processes and design, evaluation, risk and feasibility **The Cold Spray Materials Deposition Process Fundamentals and Applications** Elsevier The cold spray process produces dense, low oxide coatings which can be used in such diverse applications as corrosion control and metals repair. It has emerged as an important alternative to thermal spray coating techniques in certain areas. This pioneering book reviews both the fundamentals of the process and how it can best be applied in practice. The first part of the book discusses the development of the process together with its advantages and disadvantages in comparison with thermal spray coating techniques. Part two reviews key process parameters such as powders, nozzle design, particle temperature and velocity, and particle/substrate interaction. It also describes portable and stationary cold spray systems. The final part of the book discusses how the cold spray process can be applied in such areas as improved wear, corrosion protection, electromagnetic interference shielding and repair of damaged components. The cold spray materials deposition process is a standard reference on this important process and its industrial applications. Examines the fundamentals of the cold spraying process Assesses how the technique can best be applied in practice Describes portable and stationary cold spray systems **Handbook of Metal Injection Molding** Woodhead Publishing Metal injection molding combines the most useful characteristics of powder metallurgy and plastic injection molding to facilitate the production of small, complex-shaped metal components with outstanding mechanical properties. Handbook of Metal Injection Molding, Second Edition provides an authoritative guide to this important technology and its applications. Building upon the success of the first edition, this new edition includes the latest developments in the field and expands upon specific processing technologies. Part one discusses the fundamentals of the metal injection molding process with chapters on topics such as component design, important powder characteristics, compound manufacture, tooling design, molding optimization, debinding, and sintering. Part two provides a detailed review of quality issues, including feedstock characterisation, modeling and simulation, methods to qualify a MIM process, common defects and carbon content control. Special metal injection molding processes are the focus of part three, which provides comprehensive coverage of micro components, two material/two color structures, and porous metal techniques, as well as automation of the MIM process and metal injection molding of large components. Finally, part four explores metal injection molding of particular materials, and has been expanded to include super alloys, carbon steels, precious metals, and aluminum. With its distinguished editor and expert team of international contributors, the Handbook of Metal Injection Molding is an essential guide for all those involved in the high-volume manufacture of small precision parts, across a wide range of high-tech industries such as microelectronics, biomedical and aerospace engineering. Provides an authoritative guide to metal injection molding and its applications Discusses the fundamentals of the metal injection molding processes and covers topics such as component design, important powder characteristics, compound manufacture, tooling design, molding optimization, debinding, and sintering Comprehensively examines quality issues such as feedstock characterization, modeling and simulation, common defects and carbon content control **Belt Conveying of Minerals Corrosion of Austenitic Stainless Steels Mechanism, Mitigation and Monitoring** Woodhead Publishing This comprehensive study covers all types of corrosion of austenitic stainless steel. It also covers methods for detecting corrosion and investigating corrosion-related failure, together with guidelines for improving corrosion protection of steels. Details all types of corrosion of austenitic stainless steel Covers methods for detecting corrosion and investigating corrosion-related failure Outlines guidelines for improving corrosion protection of steels **The Welding Engineer's Guide to Fracture and Fatigue** Elsevier The Welding Engineer's Guide to Fracture and Fatigue provides an essential introduction to fracture and fatigue and the assessment of these failure modes, through to the level of knowledge that would be expected of a qualified welding engineer. Part one covers the basic principles of weld fracture and fatigue. It begins with a review of the design of engineered structures, provides descriptions of typical welding defects and how these defects behave in structures undergoing static and cyclical loading, and explains the range of failure modes. Part two then explains how to detect and assess defects using fitness for service assessment procedures. Throughout, the book assumes no prior knowledge and explains concepts from first principles. Covers the basic principles of weld fracture and fatigue. Reviews the design of engineered structures, provides descriptions of typical welding defects and how these defects behave in structures undergoing static and cyclical loading, and explains the range of failure modes. Explains how to detect and assess defects using fitness for service assessment procedures. **Laser Surface Engineering Processes and Applications** Elsevier Lasers can alter the surface composition and properties of materials in a highly controllable way, which makes them efficient and cost-effective tools for surface engineering. This book provides an overview of the different techniques, the laser-material interactions and the advantages and disadvantages for different applications. Part one looks at laser heat treatment, part two covers laser additive manufacturing such as laser-enhanced electroplating, and part three discusses laser micromachining, structuring and surface modification. Chemical and biological applications of laser surface engineering are explored in part four, including ways to improve the surface corrosion properties of metals. Provides an overview of thermal surface treatments using lasers, including the treatment of steels, light metal alloys, polycrystalline silicon and technical ceramics Addresses the development of new metallic materials, innovations in laser cladding and direct metal deposition, and the fabrication of tuneable micro- and nano-scale surface structures Chapters also cover laser structuring, surface modification, and the chemical and biological applications of laser surface engineering **Paint and Surface Coatings Theory and Practice** Woodhead Publishing This second edition of an established and well received book has been carefully revised, in many instances by the original authors, and enlarged by the addition of two completely new chapters. These deal with the use of computers in the paint industry and with the increasingly important subject of health and

safety. The chapter on pigments has also been re-written by an author new to this edition. It was the editor's intention in the first edition to provide science graduates entering the paint industry with a bridge between academia and the applied science and technology of paints. The great strength and appeal of this book remains that it deals with the technology of paints and surface coatings while also providing a basic understanding of the chemistry and physics of coatings. Extensive revision of first edition New chapter on computers and modelling New chapter on health and safety

Fundamentals of Magnesium Alloy Metallurgy Elsevier Magnesium and magnesium alloys offer a wealth of valuable properties, making them of great interest for use across a wide range of fields. This has led to extensive research focused on understanding the properties of magnesium and how these can be controlled during processing. Fundamentals of magnesium alloy metallurgy presents an authoritative overview of all aspects of magnesium alloy metallurgy, including physical metallurgy, deformation, corrosion and applications. Beginning with an introduction to the primary production of magnesium, the book goes on to discuss physical metallurgy of magnesium and thermodynamic properties of magnesium alloys. Further chapters focus on understanding precipitation processes of magnesium alloys, alloying behaviour of magnesium, and alloy design. The formation, corrosion and surface finishing of magnesium and its alloys are reviewed, before Fundamentals of magnesium alloy metallurgy concludes by exploring applications across a range of fields. Aerospace, automotive and other structural applications of magnesium are considered, followed by magnesium-based metal matrix composites and the use of magnesium in medical applications. With its distinguished editors and international team of expert contributors, Fundamentals of magnesium alloy metallurgy is a comprehensive tool for all those involved in the production and application of magnesium and its alloys, including manufacturers, welders, heat-treatment and coating companies, engineers, metallurgists, researchers, designers and scientists working with these important materials. Overviews all aspects of magnesium alloy metallurgy Discusses physical metallurgy of magnesium and thermodynamic properties of magnesium alloys Reviews the formation, corrosion and surface finishing of magnesium and its alloys

Microstructure Evolution in Metal Forming Processes Elsevier Monitoring and control of microstructure evolution in metal processing is essential in developing the right properties in a metal. Microstructure evolution in metal forming processes summarises the wealth of recent research on the mechanisms, modelling and control of microstructure evolution during metal forming processes. Part one reviews the general principles involved in understanding and controlling microstructure evolution in metal forming. Techniques for modelling microstructure and optimising processes are explored, along with recrystallisation, grain growth, and severe plastic deformation. Microstructure evolution in the processing of steel is the focus of part two, which reviews the modelling of phase transformations in steel, unified constitutive equations and work hardening in microalloyed steels. Part three examines microstructure evolution in the processing of other metals, including ageing behaviour in the processing of aluminium and microstructure control in processing nickel, titanium and other special alloys. With its distinguished editors and international team of expert contributors, Microstructure evolution in metal forming processes is an invaluable reference tool for metal processors and those using steels and other metals, as well as an essential guide for academics and students involved in fundamental metal research. Summarises the wealth of recent research on the mechanisms, modelling and control of microstructure evolution during metal forming processes Comprehensively discusses microstructure evolution in the processing of steel and reviews the modelling of phase transformations in steel, unified constitutive equations and work hardening in microalloyed steels Examines microstructure evolution in the processing of other materials, including ageing behaviour in the processing of aluminium

Nanostructured Metals and Alloys Processing, Microstructure, Mechanical Properties and Applications Elsevier Tensile strength, fatigue strength and ductility are important properties of nanostructured metallic materials, which make them suitable for use in applications where strength or strength-to-weight ratios are important. Nanostructured metals and alloys reviews the latest technologies used for production of these materials, as well as recent advances in research into their structure and mechanical properties. One of the most important issues facing nanostructured metals and alloys is how to produce them. Part one describes the different methods used to process bulk nanostructured metals and alloys, including chapters on severe plastic deformation, mechanical alloying and electrodeposition among others. Part two concentrates on the microstructure and properties of nanostructured metals, with chapters studying deformation structures such as twins, microstructure of ferrous alloys by equal channel angular processing, and characteristic structures of nanostructured metals prepared by plastic deformation. In part three, the mechanical properties of nanostructured metals and alloys are discussed, with chapters on such topics as strengthening mechanisms, nanostructured metals based on molecular dynamics computer simulations, and surface deformation. Part four focuses on existing and developing applications of nanostructured metals and alloys, covering topics such as nanostructured steel for automotives, steel sheet and nanostructured coatings by spraying. With its distinguished editor and international team of contributors, Nanostructured metals and alloys is a standard reference for manufacturers of metal components, as well as those with an academic research interest in metals and materials with enhanced properties.

Metalworking Fluids (MWFs) for Cutting and Grinding Fundamentals and Recent Advances Elsevier Metal working fluids (MWFs) provide important functions such as lubrication and cooling in the machining of metals. This book reviews the issues surrounding the use of fluids for cutting and grinding throughout the metal working process, from selection and testing to disposal. The book opens with chapters considering the mechanism and action, selection and delivery of MWFs to the machining zone before moving onto discuss the many issues surrounding MWFs during machining such as selection of the proper MWF, environmental concerns, supply methods, circulation and monitoring. The final chapters discuss the maintenance, replacement and disposal of MWFs. With its distinguished editors and international team of expert contributors, Metalworking fluids (MWFs) for cutting and grinding is an invaluable reference tool for engineers and organizations using metal cutting/machining in the manufacturing process as well as machine designers/manufacturers and machining fluid/chemical suppliers. Chapters consider the mechanism and action, selection and delivery of MWFs to the machining zone Environmental concerns, supply methods, circulation and monitoring are also discussed Written by distinguished editors and international team of expert contributors

Corrosion Control in the Aerospace Industry Elsevier Corrosion control in the aerospace industry has always been important, but is becoming more so with the ageing of the aircraft fleet. Corrosion control in the aerospace industry provides a comprehensive review of the subject with real-world perspectives and approaches to corrosion control and prevention. Part one discusses the fundamentals of corrosion and the cost of corrosion with chapters on such topics as corrosion and the threat to aircraft structural integrity and the effect of corrosion on aluminium alloys. Part two then reviews corrosion monitoring, evaluation and prediction including non-destructive evaluation of corrosion, integrated health and corrosion monitoring systems, modelling of corrosion and fatigue on aircraft structures and corrosion

control in space launch vehicles. Finally, Part three covers corrosion protection and prevention, including chapters which discuss coating removal techniques, novel corrosion schemes, greases and their role in corrosion control and business strategies in fleet maintenance. With its distinguished editor and team of expert contributors, Corrosion control in the aerospace industry is a standard reference for everyone involved in the maintenance and daily operation of aircraft, as well as those concerned with aircraft safety, designers of aircraft, materials scientists and corrosion experts. Discusses the fundamentals of corrosion and the cost of corrosion to the aerospace industry Examines the threat corrosion poses to aircraft structural integrity and the effect of corrosion on the mechanical behaviour of aircraft Reviews methods for corrosion monitoring, evaluation and prediction examining both current practices and future trends

Thermochemical Surface Engineering of Steels: Improving Materials Performance Woodhead Publishing Thermochemical surface engineering significantly improves the properties of steels. Edited by two of the world's leading authorities, this important book summarises the range of techniques and their applications. It covers nitriding, nitrocarburizing and carburizing. There are also chapters on low temperature techniques as well as boriding, sheradizing, aluminizing, chromizing, thermo-reactive deposition and diffusion. Reviews the fundamentals of surface treatments and current performance of improved materials Covers nitriding, nitrocarburizing and carburizing of iron and iron carbon alloys Examines how different thermochemical surface engineering methods can help against corrosion"

Corrosion and Surface Chemistry of Metals EPFL Press Textbook; grad.

Surface Properties and Engineering of Complex Intermetallics Duplex Stainless Steels Microstructure, Properties and Applications Woodhead Publishing Two very successful conferences - in Glasgow and Beaune - were held on duplex stainless steels during the first half of the '90s. This book takes keynote papers from each, and develops and expands them to bring the topics right up to date. There is new material to cover grades, specifications and standards, and the book is fully cross-references and indexed. The first reference book to be published on the increasingly popular duplex stainless steels, it will be widely welcomed by metallurgists, design and materials engineers, oil and gas engineers and anyone involved in materials development and properties. The first reference book on this relatively new engineering material Based on keynote papers from major international contributors Covers grades, standards and specifications

Laser Surface Modification of Alloys for Corrosion and Erosion Resistance Elsevier Corrosion and erosion processes often occur synergistically to cause serious damage to metal alloys. Laser surface modification techniques such as laser surface melting or alloying are being increasingly used to treat surfaces to prevent corrosion or repair corroded or damaged components. Laser surface modification of alloys for corrosion and erosion resistance reviews the wealth of recent research on these important techniques and their applications. After an introductory overview, part one reviews the use of laser surface melting and other techniques to improve the corrosion resistance of stainless and other steels as well as nickel-titanium and a range of other alloys. Part two covers the use of laser surface modification to prevent different types of erosion, including liquid impingement, slurry (solid particle) and electrical erosion as well as laser remanufacturing of damaged components. With its distinguished editor and international team of contributors, Laser surface modification of alloys for corrosion and erosion resistance is a standard reference for all those concerned with preventing corrosion and erosion damage in metallic components in sectors as diverse as energy production and electrical engineering. Reviews recent research on the use of laser surface modification techniques, including the prevention of corrosion and repair of corroded or damaged components Discusses the techniques for improving the corrosion resistance of steels, nickel-titanium and a range of alloys Analyses the use of laser surface modification to prevent different types of erosion, including liquid impingement and laser remanufacturing of damaged components

Laser shock peening Performance and process simulation CRC Press Laser shock peening (LSP) is a process for inducing compressive residual stresses using shock waves generated by laser pulses. It is a relatively new surface treatment for metallic materials that can greatly improve their resistance to crack initiation and propagation brought on by cyclic loading and fatigue. This book, the first of its kind, consolidates the scattered knowledge about LSP into one comprehensive volume. It describes the mechanisms of LSP and its substantial role in improving fatigue performance in terms of modification of microstructure, surface morphology, hardness, and strength. In particular, it describes numerical simulation techniques and procedures that can be adopted by engineers and research scientists to design, evaluate, and optimize LSP processes in practical applications.

Gaseous Hydrogen Embrittlement of Materials in Energy Technologies The Problem, its Characterisation and Effects on Particular Alloy Classes Elsevier Many modern energy systems are reliant on the production, transportation, storage, and use of gaseous hydrogen. The safety, durability, performance and economic operation of these systems is challenged by operating-cycle dependent degradation by hydrogen of otherwise high performance materials. This important two-volume work provides a comprehensive and authoritative overview of the latest research into managing hydrogen embrittlement in energy technologies. Volume 1 is divided into three parts, the first of which provides an overview of the hydrogen embrittlement problem in specific technologies including petrochemical refining, automotive hydrogen tanks, nuclear waste disposal and power systems, and H₂ storage and distribution facilities. Part two then examines modern methods of characterization and analysis of hydrogen damage and part three focuses on the hydrogen degradation of various alloy classes With its distinguished editors and international team of expert contributors, Volume 1 of Gaseous hydrogen embrittlement of materials in energy technologies is an invaluable reference tool for engineers, designers, materials scientists, and solid mechanicians working with safety-critical components fabricated from high performance materials required to operate in severe environments based on hydrogen. Impacted technologies include aerospace, petrochemical refining, gas transmission, power generation and transportation. Summarises the wealth of recent research on understanding and dealing with the safety, durability, performance and economic operation of using gaseous hydrogen at high pressure Reviews how hydrogen embrittlement affects particular sectors such as the petrochemicals, automotive and nuclear industries Discusses how hydrogen embrittlement can be characterised and its effects on particular alloy classes

Surface Engineering of Metals Principles, Equipment, Technologies CRC Press Surface Engineering of Metals provides basic definitions of classical and modern surface treatments, addressing mechanisms of formation, microstructure, and properties of surface layers. Part I outlines the fundamentals of surface engineering, presents the history of its development, and proposes a two-category classification of surface layers. Discussions include the basic potential and usable properties of superficial layers and coatings, explaining their concept, interaction with other properties, and the significance of these properties for proper selection and functioning. Part II provides an original classification of the production methods of surface layers. Discussions include the latest technologies in this field, characterized by directional or beam interaction of particles or of the heating medium with the treat surface.

Creep-Resistant Steels Elsevier Creep-resistant steels are widely used in the petroleum, chemical and power

generation industries. Creep-resistant steels must be reliable over very long periods of time at high temperatures and in severe environments. Understanding and improving long-term creep strength is essential for safe operation of plant and equipment. This book provides an authoritative summary of key research in this important area. The first part of the book describes the specifications and manufacture of creep-resistant steels. Part two covers the behaviour of creep-resistant steels and methods for strengthening them. The final group of chapters analyses applications in such areas as turbines and nuclear reactors. With its distinguished editors and international team of contributors, Creep-resistant steels is a valuable reference for the power generation, petrochemical and other industries which use high strength steels at elevated temperatures. Describes the specifications and manufacture of creep-resistant steels Strengthening methods are discussed in detail Different applications are analysed including turbines and nuclear reactors

Advances in Wrought Magnesium Alloys Fundamentals of Processing, Properties and Applications Elsevier This important book summarises the wealth of recent research on our understanding of process-property relationships in wrought magnesium alloys and the way this understanding can be used to develop a new generation of alloys for high-performance applications. After an introductory overview of current developments in wrought magnesium alloys, part one reviews fundamental aspects of deformation behaviour. These chapters are the building blocks for the optimisation of processing steps covered in part two, which discusses casting, extrusion, rolling and forging technologies. The concluding chapters cover applications of wrought magnesium alloys in automotive and biomedical engineering. With its distinguished editors, and drawing on the work of leading experts in the field, Advances in wrought magnesium alloys is a standard reference for those researching, manufacturing and using these alloys. Summarises recent research on our understanding of process-property relationships in wrought magnesium alloys Discusses the way this understanding can be used to develop a new generation of alloys for high-performance applications Reviews casting, extrusion, rolling and forging technologies, fundamental aspects of deformation behaviour, and applications of wrought magnesium alloys in automotive and biomedical engineering

Thermal Barrier Coatings Elsevier Effective coatings are essential to counteract the effects of corrosion and degradation of exposed materials in high-temperature environments such as gas turbine engines. Thermal barrier coatings reviews the latest advances in processing and performance of thermal barrier coatings, as well as their failure mechanisms. Part one reviews the materials and structures of thermal barrier coatings. Chapters cover both metallic and ceramic coating materials as well as nanostructured coatings. Part two covers established and advanced processing and spraying techniques, with chapters on the latest advances in plasma spraying and plasma vapour deposition as well as detonation gun spraying. Part three discusses the performance and failure of thermal barrier coatings, including oxidation and hot-corrosion, non-destructive evaluation and new materials, technologies and processes. With its distinguished editors and international team of contributors, Thermal barrier coatings is an essential reference for professional engineers in such industries as energy production, aerospace and chemical engineering as well as academic researchers in materials. Reviews the latest advances in processing and performance of thermal barrier coatings, as well as their failure mechanisms Explores the materials and structures of thermal barrier coatings incorporating cover both metallic and ceramic coating materials as well as nanostructured coating Assesses established and advanced processing and spraying techniques, including plasma vapour deposition and detonation gun spraying

Fundamentals of Aluminium Metallurgy Recent Advances Woodhead Publishing Fundamentals of Aluminium Metallurgy: Recent Advances updates the very successful book Fundamentals of Aluminium Metallurgy. As the technologies related to casting and forming of aluminum components are rapidly improving, with new technologies generating alternative manufacturing methods that improve competitiveness, this book is a timely resource. Sections provide an overview of recent research breakthroughs, methods and techniques of advanced manufacture, including additive manufacturing and 3D printing, a comprehensive discussion of the status of metalcasting technologies, including sand casting, permanent mold casting, pressure diecastings and investment casting, and recent information on advanced wrought alloy development, including automotive bodysheet materials, amorphous glassy materials, and more. Target readership for the book includes PhD students and academics, the casting industry, and those interested in new industrial opportunities and advanced products. Includes detailed and specific information on the processing of aluminum alloys, including additive manufacturing and advanced casting techniques Written for a broad ranging readership, from academics, to those in the industry who need to know about the latest techniques for working with aluminum Comprehensive, up-to-date coverage, with the most recent advances in the industry

Shape Memory and Superelastic Alloys Applications and Technologies Elsevier Shape memory and superelastic alloys possess properties not present in ordinary metals meaning that they can be used for a variety of applications. Shape memory and superelastic alloys: Applications and technologies explores these applications discussing their key features and commercial performance. Readers will gain invaluable information and insight into the current and potential future applications of shape memory alloys. Part one covers the properties and processing of shape memory effect and superelasticity in alloys for practical users with chapters covering the basic characteristics of Ti-Ni-based and Ti-Nb-based shape memory and superelastic (SM/SE) alloys, the development and commercialisation of TiNi and Cu-based alloys, industrial processing and device elements, design of SMA coil springs for actuators before a final overview on the development of SM and SE applications. Part two introduces SMA application technologies with chapters investigating SMAs in electrical applications, hot-water supply, construction and housing, automobiles and railways and aerospace engineering before looking at the properties, processing and applications of Ferrous (Fe)-based SMAs. Part three focuses on the applications of superelastic alloys and explores their functions in the medical, telecommunications, clothing, sports and leisure industries. The appendix briefly describes the history and activity of the Association of Shape Memory Alloys (ASMA). With its distinguished editors and team of expert contributors, Shape memory and superelastic alloys: Applications and technologies is be a valuable reference tool for metallurgists as well as for designers, engineers and students involved in one of the many industries in which shape memory effect and superelasticity are used such as construction, automotive, medical, aerospace, telecommunications, water/heating, clothing, sports and leisure. Explores important applications of shape memory and superelastic alloys discussing their key features and commercial performance Assesses the properties and processing of shape memory effect and superelasticity in alloys for practical users with chapters covering the basic characteristics Introduces SMA application technologies investigating SMAs in electrical applications, hot-water supply, construction and housing, automobiles and railways and aerospace engineering

Techniques for Corrosion Monitoring Woodhead Publishing Techniques for Corrosion Monitoring, Second Edition, reviews electrochemical techniques for corrosion monitoring, such as polarization techniques, potentiometric methods, electrochemical noise and harmonic analyses, galvanic sensors, differential flow through cells and

multielectrode systems. Other sections analyze the physical or chemical methods of corrosion monitoring, including gravimetric, radioactive tracer, hydrogen permeation, electrical resistance and rotating cage techniques, and examine corrosion monitoring in special environments such as microbial systems, concrete and soil, and remote monitoring and model predictions. A final group of chapters case studies covering ways in which corrosion monitoring can be applied to engine exhaust systems, cooling water systems, and more. With its distinguished editor and international team of contributors, this book is a valuable reference guide for engineers and scientific and technical personnel who deal with corrosion in such areas as automotive engineering, power generation, water suppliers and the petrochemical industry. Provides an in-depth presentation of what current corrosion monitoring techniques are available Presents insights into how to choose the best technique(s) for specific corrosion monitoring needs Includes case studies that highlight the main issues Serves as a valuable reference guide for engineers and scientific and technical personnel who deal with corrosion

Surface Coatings for Protection Against Wear *Woodhead Publishing* As wear is a surface or near surface phenomenon it has long been realised that the wear resistance of a component can be improved by providing a surface of different composition from the bulk material. Although this book concentrates on surface coatings, the distinction between surface coatings and the process of modifying the surface by changing its composition is not always clear, so some useful surface modification techniques are also considered. Surface coatings for protection against wear, consists of twelve chapters written by different authors, experts in their field. After a brief introductory chapter wear phenomena and the properties required from a coating are addressed. Chapter three covers coating characterisation and property evaluation relevant to wear resistance with an emphasis on mechanical testing of coatings. The next chapter provides an introduction to the various methods available to deposit wear resistant coatings. The following six chapters describe in detail wear resistant coatings produced by various deposition routes. Emphasis is placed on the microstructure property relationship in these coatings. Chapter eleven addresses coatings and hardfacings, produced from welding processes, specifically modern developments such as friction surfacing and pulsed electrode surfacing techniques. The final chapter is dedicated to future trends in both coating materials and coating processes. Surface coatings for protection against wear is essential for anyone involved in selecting coatings and processes and will be an invaluable reference resource for all engineers and students concerned with the latest developments in coatings technology. Essential for anyone involved in selecting coatings and processes, engineers and students

Written by an international team of experts in the field

Developments in High Temperature Corrosion and Protection of Materials *Elsevier* High temperature corrosion is a phenomenon that occurs in components that operate at very high temperatures, such as gas turbines, jet engines and industrial plants. Engineers are constantly striving to understand and prevent this type of corrosion. This book examines the latest developments in the understanding of high temperature corrosion processes and protective oxide scales and coatings. Part one looks at high temperature corrosion. Chapters cover diffusion and solid state reactions, external and internal oxidation of alloys, metal dusting corrosion, tribological degradation, hot corrosion, and oxide scales on hot-rolled steel strips. Modern techniques for analysing high temperature oxidation and corrosion are also discussed. Part two discusses methods of protection using ceramics, composites, protective oxide scales and coatings. Chapters focus on layered ternary ceramics, alumina scales, Ti-Al intermetallic compounds, metal matrix composites, chemical vapour deposited silicon carbide, nanocrystalline coatings and thermal barrier coatings. Part three provides case studies illustrating some of the challenges of high temperature corrosion to industry and how they can be overcome. Case studies include the petrochemical industry, modern incinerators and oxidation processing of electronic materials. This book is a valuable reference tool for engineers who develop heat resistant materials, mechanical engineers who design and maintain high temperature equipment and plant, and research scientists and students who study high temperature corrosion and protection of materials. Describes the latest developments in understanding high temperature corrosion Presents the latest research by the leading innovators from around the globe Case studies are provided to illustrate key points

Metal Surface Electron Physics *Elsevier* During the last thirty years metal surface physics, or generally surface science, has come a long way due to the development of vacuum technology and the new surface sensitive probes on the experimental side and new methods and powerful computational techniques on the theoretical side. The aim of this book is to introduce the reader to the essential theoretical aspects of the atomic and electronic structure of metal surfaces and interfaces. The book gives some theoretical background to students of experimental and theoretical physics to allow further exploration into research in metal surface physics. The book consists of three parts. The first part is devoted to classical description of geometry and structure of metal crystals and their surfaces and surface thermodynamics including properties of small metallic particles. Part two deals with quantum-mechanical description of electronic properties of simple metals. It starts from the free electron gas description and introduces the many body effects in the framework of the density functional theory, in order to discuss the basic surface electronic properties of simple metals. This part outlines also properties of alloy surfaces, the quantum size effect and small metal clusters. Part three gives a succinct description of metal surfaces in contact with foreign atoms and surfaces. It treats the work function changes due to alkali metal adsorption on metals, adhesion between metals and discusses the universal aspects of the binding energy curves. In each case extensive reference lists are provided.