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*Refractory Technology Fundamentals of Refractory Technology Elements of Refractory Technology Refractory Technology Handbook of Industrial Refractories Technology The Technology of Ceramics and Refractories The Technology of Ceramics and Refractories Monolithic Refractories Refractory Technology Incorporated V. Koski Refractory Metal Alloys Metallurgy and Technology Introduction to Refractories for Iron- and Steelmaking Refractory Linings Refractory Engineering and Kiln Maintenance in Cement Plants Refractories for the Chemical Industries Changes in Refractory Technology Forming The Refractories Journal Refractory Material Selection for Steelmaking Hand Book Of Industrial Refractories Technology Refractories for Aluminium Advanced and Refractory Ceramics for Energy Conservation and Efficiency Refractories for Aluminum Refractory Linings Technology of Monolithic Refractories Fuels, Furnaces and Refractories Refractory Materials for Flame Deflector Protection System Corrosion Control: Similar Industries And/or Launch Facilities Survey Physical Metallurgy of Refractory Metals and Alloys Refractory Carbides An Introduction to Ceramics and Refractories Refractory Metal Alloys Handbook of Refractory*

*Compounds Reliability of Compound Analogue Semiconductor Integrated Circuits The Measurement of Thermal Conductivity of Refractory Materials Coatings Technology Handbook Handbook of Refractory Carbides & Nitrides 7th International Symposium on High-Temperature Metallurgical Processing Materials and Equipment - Whitewares - Refractory Ceramics - Basic Science Foseco Ferrous Foundryman's Handbook Dictionary of refractory and refractory engineering Refractory Materials Refractories Handbook*

*This book deals with two important areas that directly affect kiln availability for production. These two aspects decide if the cement plant would make profit or loss during the year. At the moment there is no book that deals with these aspects. The literature on these subjects is scattered and the totality of the subject is missing. The book Refractory Engineering and Kiln Maintenance in Cement Plants is an utmost requirement for the Cement Industry and would fulfil the needs of the Cement Industry all over the world. It has brought out various developments of refractory with the changing technological scenario. The contents is totally comprehensive in every respect and has been planned in such a way that starting from Changing Phases of Kiln Systems and Choice of Refractories, Improving the Kiln Up-time, there are also important chapters on Inspection, Storage and Packing of Refractories, Refractory Management, Kiln Maintenance with a bonus of a glossary of the technical*

*terms. The book will serve as a handbook for production managers, production engineers, Kiln operators, refractory engineers, maintenance managers, purchase engineers, inventory engineers, warehouse officers and storekeepers. Fuels, Furnaces and Refractories focuses on the sources and efficient use of energy available to modern industry. This book begins with the classification, properties, tests, and different kinds of fuels, as well as trends in fuel utilization. This text also tackles the generation and distribution of electricity from both chemical and nuclear energy sources. Subsequent chapters focus on the thermodynamics, physics, chemistry, and kinetics of combustion of fuels; the burner design; the heat transfer and flow of gases through furnaces and flues; and ways of controlling energy supply rates and temperatures. The refractory materials, which are heat-resisting substances, are also described. The technology, operation, energy, environmental, analysis, and future development of the metallurgical industries utilizing high temperature processes are covered in the book. The innovations on the extraction and production of ferrous and nonferrous metals, alloys, and refractory and ceramic materials, the heating approaches and energy management, and the treatment and utilizations of the wastes and by-products are the topics of special interests. This book focuses on the following issues: High Efficiency New Metallurgical Process and Technology Fundamental Research of Metallurgical Process Alloys and Materials*

*Preparation Direct Reduction and Smelting Reduction Coking, New Energy and Environment Utilization of Solid Slag/Wastes and Complex Ores Characterization of High Temperature Metallurgical Process This publication documents Proceedings of the Symposium on Metal lurgy and Technology of Refractory Metal Alloys, held in Washington, D.C. at the Washington Hilton Hotel on April 25-26, 1968, under sponsorship of the Refractory Metals Committee, Institute of Metals Division, of the Metallurgical Society of AIME, and the National Aeronautics and Space Administration. The Symposium presented critical reviews of selected topics in refractory metal alloys, thereby contributing to an in-depth understanding of the state-of-the-art, and establishing a base line for further research, development, and application. This Symposium is fifth in a series of conferences on refractory metals, sponsored by the Metallurgical Society of AlME. Publications issuing from the conferences are valuable technical and historical source books, tracing the evolution of refractory metals from early laboratory alloying studies to their present status as useful engineering materials. Refractory metals are arbitrarily defined by melting point. A 0 melting temperature of over 3500 F was selected as the minimum for this Symposium, thus excluding chromium and vanadium, which logically could be treated with other refractory metals in Groups VA and VIA of the periodic table. The Refractory Metals Committee is planning reviews of chromium and vanadium in subsequent conferences.*

*This updated reprint provides up-to-date information on refractories technology presented by recognized experts in the field. Produced from focused sessions of two Refractory Ceramics Division meetings, refractory scientists from around the world were invited to provide overviews of the scientific principles related to refractory manufacturing and performance. The result is this informative volume and a current view of the Fundamentals of Refractory Technology. Proceedings of the Lecture Series presented at the 101st and 102nd Annual Meetings held April 25-28, 1999, in Indiana and April 30-May 3, 2000, in Missouri; Ceramics Transactions, Volume 125. This book details the peculiarities of the requirements for refractories designed for aluminium metallurgical process: reduction, cast house, and anode production. The author describes requirements specific to the properties and structure of refractory materials that differentiate it from the refractories for ferrous metallurgy and other refractories. A comparison is drawn between the properties and structure of refractories and carbon cathode materials from different points of view: from the point of physical chemistry and chemistry interactions during the metallurgical process and from the point of design of reduction pots and furnaces with the aspect to the service life time of metallurgical aggregates. All Refractories Are Ceramics but Not All Ceramics Are Refractories Ceramics and refractories cover a wide range of fields and applications, and their relevance*

*can be traced as far back as 24,000 BC to the first man-made piece of earthenware, and as recently as the late 1900s when ceramics and ceramic matrix composites were developed to withstand ultra-high temperatures. Beginning with a detailed history of ceramics, An Introduction to Ceramics and Refractories examines every aspect of ceramics and refractories, and explores the connection between them. The book establishes refractories as a class of ceramics with high fusion points, introduces the fundamentals of refractories and ceramics, and also addresses several applications for each. Understand Ceramic Properties and Refractory Behavior The book details applications for natural and synthetic ceramics, as well as traditional and engineering applications. It focuses on the various thermal and thermo-mechanical properties of ceramics, classifies refractories, describes the principles of thermodynamics as applied to refractories, and highlights new developments and applications in the ceramic and refractory fields. It also presents end-of-chapter problems and a relevant case study. Divided into three sections, this text: Introduces and details the applications of ceramics and refractories Discusses the selection of materials and the two stages in selection Describes the phase equilibriums in ceramic and refractory systems Outlines the three important systems: unary, binary, and ternary Considers corrosion of ceramics and refractories, failures in ceramics and refractories, and the design aspects Addresses bonding, structures of*

*ceramics, defects in ceramics, and ceramics' microstructures Covers the production of ceramic powders starting from the raw materials Explains four forming methods Highlights three types of thermal treatments Defines mechanical properties, and thermal and thermo-mechanical properties Classifies materials and designates classes Addressing topics that include corrosion, applications, thermal properties, and types of refractories, An Introduction to Ceramics and Refractories provides you with a basic knowledge of the fundamentals of refractories and ceramics, and presents a clear connection between refractory behavior and ceramic properties to the practicing engineer. Encompasses the entire range of industrial refractory materials and forms: properties and their measurement, applications, manufacturing, installation and maintenance techniques, quality assurance, and statistical process control. This book promotes understanding of the raw material selection, refractory design, tailor-made refractory developments, refractory properties, and methods of application. It provides a complete analysis of modern iron and steel refractories. It describes the daily demands on modern refractories and describes how these needs can be addressed or improved upon to help achieve the cleanest and largest yields of iron and steel. The text contains end-of-chapter summaries to help reinforce difficult concepts. It also includes problems at the end of chapters to confirm the reader's understanding of topics such as hoop stress modeling in steel ladle and*

*vessels, establishment of thermal gradient modeling , refractory corrosion dynamics, calculation of Blast furnace trough dimension based on thermal modeling, to name a few. Led by editors with backgrounds in both academia and industry, this book can be used in college courses, as a reference for industry professionals, and as an introduction to the technology for those making the transition to industry. Stands as a comprehensive introduction to the science and technology of modern steel and iron-making refractories that examines the processes, construction, and potential improvement of refractory performance and sustainability; Serves as a versatile resource appropriate for all levels, from the student to industry novices to professionals; Reinforces difficult-to-grasp concepts with end-of-chapter summaries; Maximizes reader understanding of key topics, such as refractory selection for steel ladle and vessels, and their corrosion dynamics, with real life problems. Introduction * Foundations of Hot Processing * Foundations of Refractory Applications * Principles of Thermal Stability * Principles of Corrosion Resistance: Oxidation-Reduction * Principles of Corrosion Resistance: Hot Liquids * Principles of Corrosion Resistance: Hot Gases and Dusts * The Working Refractory Product Line * The Industrial Refractory Product Line * Refractory Practice * Design Properties: Thermal and Electrical * Design Properties: Mechanical * Refractory Manufacture * Refractory Installation and Maintenance * Conclusion * References * Refractory Patints * Index. The necessary*

*2nd edition offered the possibility to add new terms especially from the field of refractory engineering. The title was correspondingly change to 'Dictionary of refractory and refractory engineering'. This dictionary contains now approximately 5.500 terms from the special field of refractory materials, their testing and use and standard technical vocabulary. At the end there is a list of dictionaries focusing on related fields and technology. Furthermore, a list of CD-ROMs with terms used in the ceramic industry (German, English) and refractory industry (5 languages) is given. Further mention is made of cover-to-cover translations of books on refractory materials and refractory engineering as well as European Standards (CEN) for refractories available in English, German and French. These Standards are of great assistance to learn the English or German technical terms in the refractory field. This work describes the technology necessary to optimize the performance of any refractory lining. It provides an overview of the thermomechanical behaviour and wear of refractory lining systems, and details the structural behaviour of several classical refractory geometries, highlighting the critical regions of each lining system where high stress is most likely to create fractures. This book provides a basic understanding of refractories. This includes the fundamentals of refractory technology supported by phase diagrams as well as detailing the prominent applications of these essential industrial materials. This book covers all the facets of refractory technology,*

*starting from classification, properties, standard specifications, details of the conventional shaped refractories, including relevant phase diagrams & application areas and also the details of unshaped refractories including various classifications, bonding, additives and their applications. This comprehensive reference details the technical, chemical, and mechanical aspects of high-temperature refractory composite materials for step-by-step guidance on the selection of the most appropriate system for specific manufacturing processes. The book surveys a wide range of lining system geometries and material combinations and covers a broad In this valuable handbook, various monolithic refractories currently in use are described in detail, with particular attention paid to their chemical and physical behaviors during manufacturing, installation, and the duty cycle. Critical aspects of reactions involved within the refractory body as it approaches the used temperature within the processing environment are addressed from the practitioner's point of view. To ensure optimum performance, the application, installation, and design of refractory components are described in detail. In short, the book contains a comprehensive discussion on monolithic refractories concerning their formulation, manufacture, and use. The information is most current, with suitable tables and figures. Also, historical perspectives on the evolution of the refractory industry are provided. This book is primarily designed to serve as a handbook for practicing ceramic engineers,*

*scientists, raw material suppliers, and research and development personnel in the refractory manufacturing industry and industries associated with high temperature material processing. It may also be used in courses for ceramic engineering students specializing in refractories. Contents: Raw MaterialsCastable RefractoriesPumpable CastablesPlastic RefractoriesRamming MixesGunning MixesMortarsCoatingsDry VibratablesWear MechanismsManufacturingApplication DesignsEvaluation and TestsLining Readership: Professionals dealing with refractories — raw material suppliers, manufacturers and users. keywords:Alumina;Silica;Mullite;Colloidal Silica;Trough;Tundish;Castable;Pumpable;Ramming Mix;Gunning Mix Scientific and technical progress in our country depends largely on supplying im portant sections of the national economy with modern materials. This may be done by improving traditional materials, as well as by developing new ones that may be used under severe temperature, stress, and velocity conditions and that have com binations of certain physical and chemical properties. Refractory, superhard, corrosion-resistant, semiconductor, dielectric, and other materials are thus being created that will permit the development of new, highly effective tool materials, the implementation of technological processes in plasmas, and the solution of some materials-related aerospace and nuclear power problems. Refractory compounds play a vital role in the*

*development of new materials and in the improvement of traditional materials. But information available on the properties of refractory compounds needed by scientists and engineers engaged in producing new materials for industry and technology has not yet been properly systematized. A first attempt in 1963 at such systematization (the first edition of this book) played some part in expanding the development and use of refractory compounds, but the information has now become seriously outdated, especially since in the last decade the study of refractory compounds in the USSR and abroad has grown very rapidly. In 1964 the handbook was, with certain additions, translated and published in the USA, but that publication was not readily available to the Soviet reader. During the Technology Prioritization Panel held in December 2007, the Constellation Program (CxP) Ground Operations Project (GOP) identified corrosion control technologies as their #2 technology need for initial capability to meet Draft Stretch/Operability requirements for reduced ground processing complexity, streamlined integrated testing, and operations phase affordability. The Refractory Materials for Flame Deflector Protection System Corrosion Control task under the Supportability project will develop refractory technologies that will provide support at Kennedy Space Center (KSC) launch facilities and ground systems through increased operational life cycles. As a result of the constant deterioration from launch heat/blast effects and aggressive environmental exposure, the refractory*

*materials currently used as a part of the launch pad flame deflectors have become very susceptible to failure, resulting in large pieces of refractory materials breaking away from the steel base structure. These pieces are projected at high speed during launch, and jeopardize the launch complex, vehicle, and safety of the crew. Replacement refractory systems must be developed to withstand the extremely corrosive environment at the launch pads, and the highly corrosive hydrochloric acid and heat/blast effects that are generated by the solid rocket boosters during a launch. Advanced technologies for the corrosion protection of launch pad flame deflectors are necessary to address these problems and significantly impact ground processing and launch safety. The objective of the ETDP project, Refractory Materials for Flame Deflector Protection System Corrosion Control is to develop replacement refractory materials that exhibit long-term resistance to degradation. This degradation results from the extremely corrosive Florida coastal environment and aggressive launch conditions. The highly corrosive solid rocket booster (SRB) exhaust, extreme temperature fluctuations between SRB heat impingement and noise suppression water deluge, and SRB blast vibrations, in combination, have a pronounced detrimental influence on the degradation of refractory materials. The flame deflector must safely divert flames, exhaust, and small items that are loosened during a launch. In essence, the system must prevent debris from bouncing back*

*and hitting the launch complex and vehicle. Performance in this regard is dependent upon integrity of the refractory materials used on the flame deflectors. The development process for the ETDP Refractory Materials for Flame Deflector Protection System Corrosion Control project has four primary elements: Capability to develop a refractory protection system for the launch pad flame deflectors, Capability to develop advanced refractory materials, Capability to develop material requirements, system specifications, and qualification standards for the refractory material protection system, Capability to incorporate the refractory material formulation onto the flame deflector base structure, and evaluate the in-situ performance in an integrated demonstration on a scaled, simulated flame deflector. This book describes the essential features of refractory technology and is useful for degree & diploma courses in engineering. AMIE, AMIIM and IIChE examinations. Short question & answers and multiple choice question & answers drawn from the examination paper of various engineering colleges and professional bodies examinations given at the end of the book enhances its utility for the students. This volume is part of the Ceramic Engineering and Science Proceeding (CESP) series. This series contains a collection of papers dealing with issues in both traditional ceramics (i.e., glass, whitewares, refractories, and porcelain enamel) and advanced ceramics. Topics covered in the area of advanced ceramic include bioceramics, nanomaterials,*

*composites, solid oxide fuel cells, mechanical properties and structural design, advanced ceramic coatings, ceramic armor, porous ceramics, and more. Refractory materials are used in several industries involving very aggressive environments, thus the number of chemical, thermal and physical properties required for a refractory material are high and diverse. In Refractory Materials: Characteristics, Properties and Uses, the authors suggest that the determination of the mineralogical phases amounts is an essential parameter for the design of new refractories matrix to have command over the desired properties and quality of the final product. The subsequent chapter may serve as a guide to the composition- and microstructure-based interpretation of experimental findings in refractory materials. Based on the concepts and refractory materials data provided in this book, taking into account the general issues concerning strength measurements, the reader should be able to realistically assess even such complex quantities as thermal shock resistance parameters. Next, a systematic joint study of the temperature dependences of the isobaric molar heat capacity CP(T) and the volume coefficient of thermal expansion β(T) of polyatomic solids was carried out on the example of refractory oxide ceramics: periclase, MgO, and corundum, Al2O3. Both ceramics have the widest practical applications and are considered as reference substances, which justifies their choice for research. In the closing chapter, the B-model is applied to a joint*

*study of temperature dependences of the principal thermodynamic functions of the selected refractory oxide ceramics, namely, periclase, MgO, and corundum, Al2O3. Primarily, the isobaric molar heat capacity CP(T), the volume coefficient of thermal expansion β(T), and their correlation, β(CP), were investigated between T = 0 and the melting point Tm. Under the B-model control, mutually consistent calorimetric (change in the molar enthalpy, the molar entropy, the reduced thermodynamic potential) and dilatometric (the molar volume, the volume coefficient of thermal expansion) data were obtained and tabulated in the entire solid state range of the ceramics. This work describes the technology necessary to optimize the performance of any refractory lining. It provides an overview of the thermomechanical behaviour and wear of refractory lining systems, and details the structural behaviour of several classical refractory geometries, highlighting the critical regions of each lining system where high stress is most likely to create fractures. This book details the rigorous requirements for refractories designed for aluminium metallurgical processes: reduction, cast house, and anode production. The author describes requirements specific to the properties and structure of refractory materials that differentiate it from materials used for ferrous metallurgy, among others. A comparison is drawn between the properties and structure of refractories and carbon cathode materials from different points of view: from the perspective of*

*physical chemistry and chemical interactions during the metallurgical process and from the aspect of designing reduction pots and furnaces to accommodate the lifetime of metallurgical aggregates that are a part of aluminum refractory processes. This work describes current engineering practices and techniques in the fields of ceramics in the Soviet Union. Appearing for the first time in English, the book will be extremely useful as a text for ceramic education and as a reference guide for anyone in the field. Techniques are treated in detail not heretofore available. Contents Preface * Part I, Building Ceramics: Classification of Products * Wall, Roof, and Facing Materials * Ceramzite (light, porous ceramic) * Stove Tiles and Majolica Parts * Stoneware * Part II, Refractory Materials: Classification of Refractories * Properties of Refractories * Chamotte Products * Products with a High Alumina Content * Dinas * Magnesite Refractories * Forsterite Refractories * Chromite Refractorries and Their mixture with Magnesites * Refractories Containing Zirconia * Dolomite Refractories * Refractories Containing Carbon * Highly Refractory Materials and Pure Oxide Products * Refractory Mortars, Cements, and Concrete, Light weight (heat-insulating) Refractories * Part III, Fine Ceramics: Raw Materials *Preparation of Ceramic Paster * Molding and Shaping * Kiln Drying and Firing * Glazing * Glazes * Ceramic Colors * Sorting, Finishing and Decorating * Porcelain * Household and Art China * Porcelain Used in Electrical Engineering * Electric*

*Insulators and Other Parts Made of Special Pastes * Fine Stoneware * Faience and Semiporcelain * Faience and Semiporcelain for Sanitation and Building * Glazed Faience Tiles * Bibliography The first book since 1974 written by a steelmaking end user and refractory engineer Why do you pick the refractory you do? How do you choose? Where do you start the selection process? The answers to these questions must always take into account the balance of competing interests among operations, purchasing, and the suppliers. Refractory Material Selection forSteelmaking is the ultimate guide to finding ideal answers to these questions. By following the step-by-step instructions—paired with detailed explanations and full-color diagrams—readers will be able to critically select the materials that are most appropriate for them. This book considers: The goals of refractory selection What causes refractories to wear out The properties of refractories and their raw materials Specific refractory applications Key strategies used to procure refractories Tom Vert's 25 years of experience in steelmaking combined with a ceramic engineering background provide comprehensive information that will benefit anyone working with refractories in steelmaking or any other industry. The principal reasons which induced the authors to write this book and the features of the book are set forth in the preface to the Russian edition. That section of the science of metals which in Russian is called "metallovedenie" or the "physical chemistry of metals" is generally referred to in scientific and*

*technical literature published in the English language by the term "physical metallurgy." These concepts are much broader than the term" metallography," used in the scientific and technical literature of various countries, and applied solely to research on the interrelationships of the structure and proper ties of metals and alloys. Each science must have its own subject and its own method of research. Certainly, all specialists will agree that metals and alloys, including their solid solutions, mechanical mix tures, and metallic compounds, form the subject of "physical metallurgy" or "physical chemis try of metals." The aim of this science. is to produce a theory and to elucidate the experimental relationships which ought finally to make it possible to calculate quantitatively alloys Of given properties for any working conditions and parameters. The present stage of technological development makes new and ever more complex demands on materials that have to work under conditions of high temperature and pressure, in high vacuum, and in corrosive media. In consequence special importance is now at tached to the refractory compounds of transition metals of groups IV to VI with such nonmetals as boron, carbon, silicon, and nitro gen. These compounds possess high melting points, great hard ness, and high refractory and corrosion-resisting properties. The most widely used and important compounds of this type from a technological point of view are the carbides, which are already fairly widely used in various fields of technology. The present collection of papers contains*

*the results of re cent investigations into methods of producing high-purity carbides and also components made of the carbides and their alloys. Great attention has been paid to the study of a wide range of properties of the carbides and of alloys based on them, viz., the electro-and thermophysical, thermodynamic, mechanical, and chemical prop erties, and also to the utilization of the carbides as wear-and abrasion-resistant materials. In contrast to many previous publications dealing with carbides, the results presented in this collection relate to the properties of carbides having a definite phase composition, corresponding to a higher degree of purity 0 In some of the contributions the physical and chemical properties of the carbides are interpreted in terms of certain solid-state models and concepts concerning the types of chemical bonding in these compounds. The Foseco Ferrous Foundryman's Handbook is a practical reference book for all those concerned with making castings in any of the commonly used alloys, by any of the usual moulding methods. International SI units are used throughout, but in almost all cases conversions to the more familiar Metric and Imperial units are given. Wherever possible, Casting Alloy Specifications include equivalent specifications for several countries as well as international specifications. Individual chapters cover the casting of light alloys, copper-based alloys, all types of cast-iron and steel. For each group of alloys, specifications and typical applications are described, together with details of melting practice,*

*metal treatment and casting practice. Sand moulding materials, including green sand and chemically bonded sands are also included. This book explains refractories with the support of phase diagrams detailing prominent applications of these industrial materials. The initial chapters cover fundamentals of refractories, classifications, properties and testing while later chapters describe different common shaped and unshaped refractories in detail and special refractories in a concise manner. Second edition includes new classifications, microstructures, effect of impurities with binary and ternary phase diagrams and recent trends in refractories including homework problems and updated bibliography. Features: Provides exclusive material on refractories. Discusses detailed descriptions of different shaped and unshaped refractories. Covers concepts like environmental issues, recycling, and nanotechnology. Explores details on testing and specifications including thermochemical and corrosion behavior. Includes a separate chapter on trends of refractories and other issues. This book aims at juniors/senior undergraduate students and researchers of ceramics, metallurgical engineering, and refractories. Serving as an all-in-one guide to the entire field of coatings technology, this encyclopedic reference covers a diverse range of topics-including basic concepts, coating types, materials, processes, testing and applications-summarizing both the latest developments and standard coatings methods. Take advantage of the insights and experience of over The*

*book provides process engineers, an insight into refractories focusing on its importance and requirements in chemical process industries such as refinery and petrochemicals, syngas manufacturing, coal gasification, limestone calcinations, carbon black, glass, and cement production. Additionally the book discusses the refractory requirements for the CFBC boiler, and waste heat utilization process to generate steam. The book describes characterization of refractory material and selection process of the refractory for lining different equipments pertaining to the chemical process industry. The book covers refractory installation techniques, and the precautions to be taken during installation are discussed in detail along with the theoretical background. It explains the physical and chemical factors that influence the performances of refractory, mechanism of its degradation in service and emphasizes on the thermo-chemical and thermo-mechanical aspects and their role in that process . The content lays out different methods of monitoring Refractory lining conditions while the furnace is in operation and also elucidates few methods to repair the worn out lining without taking a shutdown. The scheme of investigation of a refractory failure is an added feature. Refractory carbides and nitrides are useful materials with numerous industrial applications and a promising future, in addition to being materials of great interest to the scientific community. Although most of their applications are recent, the refractory carbides and nitrides have been*

*known for over one hundred years. The industrial importance of the refractory carbides and nitrides is growing rapidly, not only in the traditional and well-established applications based on the strength and refractory nature of these materials such as cutting tools and abrasives, but also in new and promising fields such as electronics and optoelectronics. This volume contains a collection of 19 papers from the 11th International Symposium on Ceramic Materials and Components for Energy and Environmental Applications (CMCEE-11), June 14-19, 2015 in Vancouver, BC, Canada. Papers were presented in the below five symposia from Track 2 on the topic of Ceramics for Energy Conservation and Efficiency: Advanced Ceramics and Composites for Gas Turbine Engines Advanced Refractory Ceramic Materials and Technologies Advanced Ceramic Coatings for Power Systems Energy Efficient Advanced Bearings and Wear Resistant Materials Advanced Nitrides and Related Materials for Energy Applications*


- *Refractory Technology*
- *Fundamentals Of Refractory Technology*
- *Elements Of Refractory Technology*
- *Refractory Technology*

- *Handbook Of Industrial Refractories Technology*
- *The Technology Of Ceramics And Refractories*
- *The Technology Of Ceramics And Refractories*
- *Monolithic Refractories*
- *Refractory Technology Incorporated V Koski*
- *Refractory Metal Alloys Metallurgy And Technology*
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- *Refractory Carbides*
- *An Introduction To Ceramics And Refractories*
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- *Refractory Materials*
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