

# The Chemistry Of Transition Metal Carbides And Nitrides

The Chemistry of Transition Metal Carbides and Nitrides  
The Physics and Chemistry of Carbides, Nitrides and Borides  
2D Metal Carbides and Nitrides (MXenes)  
Materials Science of Carbides, Nitrides and Borides  
Transition Metal Carbides and Nitrides  
MXenes  
The Chemistry of Transition Metal Carbides and Nitrides  
Contributions to the Data on Theoretical Metallurgy  
Handbook of Refractory Carbides and Nitrides  
Transition Metal Carbides and Nitrides  
Carbide, Nitride and Boride Materials Synthesis and Processing  
Electronic Structure of Refractory Carbides and Nitrides  
Refractory Hard Metals  
Carbides – Nitrides – Borides  
Interactions of Sulfur with Nanostructured, Early Transition Metal Carbides and Nitrides  
Transition Metal Carbides and Nitrides (MXenes)  
Handbook  
A New Interpretation of Interstitial Compounds  
Uranium Carbides, Nitrides and Silicides, 1963–1965  
Electrical Properties of Some Transition–metal Carbides and Nitrides  
Chemical Reactions of Carbides, Nitrides, and Diborides of Titanium and Zirconium and Chemical Bonding in These Compounds  
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this book arose from a symposium titled transition metal carbides and nitrides preparation properties and reactivity organized by jae sung lee masatoshi nagai and myself the symposium was part of the 1995 congress of pacific rim chemical societies held in honolulu hawaii between december 17 22 1995 the meeting was the first major conference to exclusively address the theme of metal carbides and nitrides and brought together many of the major researchers in the field over 50 scientists and engineers reported their latest findings in five sessions of presentations and discussions the book closely follows the topics covered in the conference theory of bonding structure and composition catalytic properties physical properties new methods of preparation spectroscopy and microscopy the book is unique in its coverage it provides a general introduction to the properties and nature of the materials but also covers their latest applications in a wide variety of fields it should thus be of interest to both experts and nonexperts in the fields of material science solid state chemistry physics ceramics engineering and catalysis the first chapter gives an overview and many of the chapters provide summaries of advanced topics all contributions were peer reviewed

carbides nitrides and borides are families of related refractory materials traditionally they have been employed in applications associated with engineering ceramics where either high temperature strength or stability is of primary importance in recent years there has been a growing awareness of the interesting electrical thermal and optical properties exhibited by these materials and the fact that many can be prepared as monolithic ceramics single crystals and thin films in practical terms carbides nitrides and borides offer the prospect of a new generation of semiconductor materials for example which can function at very high temperatures in severe environmental conditions however as yet we have only a limited understanding of the detailed physics and chemistry of the materials and how the preparation techniques influence the properties under the auspices of the nato science committee an advanced research workshop arw was held on the physics and chemistry of carbides nitrides and borides university of manchester 18 22 september 1989 in order to assess progress to date and identify the most promising themes and materials for future research an international group of 38 scientists considered developments in 5 main areas the preparation of powders monolithic ceramics single crystals and thin films

phase transformations microstructure defect structure and mass transport materials stability theoretical studies electrical thermal and optical properties of bulk materials and thin films

this book describes the rapidly expanding field of two dimensional 2d transition metal carbides and nitrides mxenes it covers fundamental knowledge on synthesis structure and properties of these new materials and a description of their processing scale up and emerging applications the ways in which the quickly expanding family of mxenes can outperform other novel nanomaterials in a variety of applications spanning from energy storage and conversion to electronics from water science to transportation and in defense and medical applications are discussed in detail

a survey of current research on a wide range of carbide nitride and boride materials covering the general issues relevant to the development and characterisation of a variety of advanced materials topics include structure and electronic properties modeling processing high temperature chemistry oxidation and corrosion mechanical behaviour manufacturing and applications the volume complements more specialised books on specific materials as well as more general texts on ceramics or hard materials presenting a survey of materials research as a key to technological development after decades of research the materials are being used in electronics wear resistant refractory and other applications but numerous new applications are possible roughly equal numbers of papers cover theoretical and experimental research in the general field of materials science of refractory materials audience researchers and graduate students in materials science and engineering

since their discovery in 2011 mxenes 2d carbides nitrides and carbonitrides of early transition metals have developed into one of the largest and most intensively studied families of 2d materials they offer unique properties and are being explored variety of applications this book compiles the most important research from a pioneer of the field professor yury gogotsi and his interdisciplinary research team as well as numerous collaborators worldwide it reports on the discovery and rise of mxenes and describes their synthesis and processing properties and incorporation into polymer ceramic and metal matrices to produce composites it also discusses the potential of mxenes for use in energy storage optics electronics and sensing as well as biomedical environmental and electrocatalysis applications the book will appeal to anyone interested in nanomaterials and their synthesis properties and applications

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the main objective of this book is to 1 provide a complete review of the structures and properties of refractory carbides and nitrides 2 provide a thorough assessment of technology processing and equipment and systems used in production and r d with emphasis on advanced designs and 3 identify and describe the applications in new and emerging areas

carbide nitride and boride materials synthesis and processing is a major reference text addressing methods for the synthesis of non oxides each chapter has been written by an expert practising in the subject area affiliated with industry academia or government research thus providing a broad perspective of information for the reader the subject matter ranges from materials properties and applications to methods of synthesis including pre and post synthesis processing although most of the text is concerned with the synthesis of powders chapters are included for other materials such as whiskers platelets fibres and coatings carbide nitride and boride materials synthesis and processing is a comprehensive overview of the subject and is suitable for practitioners in the industry as well as those looking for an introduction to the field it will be of interest to chemical mechanical and ceramic engineers materials scientists and chemists in both university and industrial environments working on or with refractory carbides nitrides and borides

this book presents a systematic description of the electronic and physico chemical properties of transition metal carbides and nitrides the discussion is devoted to the theoretical modeling of refractory carbides and nitrides and alloys based on them and the

authors uniquely make use of computational methods to calculate their spectroscopic electric magnetic superconducting thermodynamical and mechanical properties

a comprehensive overview of the synthesis of high quality mxenes in transition metal carbides and nitrides mxenes handbook synthesis processing properties and applications a team of esteemed researchers provides an expert review encompassing the fundamentals of precursor selection mxene synthesis characterizations properties processing and applications you ll find detailed discussions of the selection of mxene members for specific applications as along with summaries of the physical and chemical properties of mxenes including electrical mechanical optical electromechanical electrochemical and electromagnetic properties the authors delve into both successful and unsuccessful synthesis examples offering detailed explanations of various failures to facilitates a comprehensive understanding of the reasons behind unsuccessful syntheses additionally they provide detailed examinations on the characterizations of mxenes empowering readers to develop a sophisticated understanding of how to achieve optimal quality flake size oxidation states and more you ll also find a thorough review of common applications of mxenes including electrochemical applications electromagnetic interference shielding communications devices and more comprehensive explorations of solution and non solution processing of mxenes practical discussions of the synthesis of high quality mxene powders colloidal solutions and flakes including information about mxene precursors fulsome treatments of mxene precursor selection and their impact on mxene quality tailored to meet the needs of graduate students researchers and scientists in the areas of materials science inorganic chemistry and physical chemistry the transition metal carbides and nitrides mxenes handbook will also benefit biochemists and professionals working in drug delivery

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