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Interfaces In Materials Atomic Structure

Energy-efficient spintronic devices are closer to being realized thanks to a new mechanism predicted by RIKEN

physicists for converting between electrical current vortices and a spin current.

2D materials and interfaces can convert spin current into a vortex of charge current

The new tool is based on atomic

force microscopy ... two different sections of a material. Those interfaces are key to understanding a material's structure and properties. Images of similar ...

A scattering-type scanning

nearfield optical microscope probes materials at the nanoscale

The new tool is based on atomic force microscopy (AFM), in which ... or the interfaces between two different sections of a material. Those interfaces are key to

understanding a material's structure ...

Custom-made MIT tool probes materials at the nanoscale

(b) Heterogeneous interface of BAs-GaN examined by transmission electron microscopy

with atomic resolution. Insets, crystal structure of BAs (bottom ... To keep computer processors cool, materials ...

Cooling high power electronics - boron arsenide spreads heat better than

diamond

Latest Explore all the latest news and information on Physics World; Research updates Keep track of the most exciting research breakthroughs and technology innov ...

‘Slidetronics’ makes its debut

An introduction to the properties of engineering materials that emphasizes the correlation between atomic and microscopic structure and the macroscopic ... The course examines the interfaces between ...

Materials Science and Engineering

Material could be used in future quantum computing applications. An international team of physicists led by the University of Minnesota has discovered that a

unique superconducting metal is more ...

Researchers Uncover Unique Properties of a Promising New Superconductor for Quantum Computing

remedy this limitation by showing

that an intrinsically centrosymmetric vdW material, h-BN, can be engineered on the atomic scale to become ferroelectric. A bulk h-BN crystal has a layered structure .

Two-dimensional

ferroelectricity by design

It is well known how the properties of solids arise from their symmetry, whether this is defined within the bulk interior, or by the presence of a surface or interface ... materials design to control ...

Mesoscale Materials Laboratory

We observe changes from the micrometer to the atomic level ... energy storage materials, or biominerals (2–4). Here, functionality is often defined by

local heterogeneities in structure and/or ...

Sparse ab initio x-ray transmission spectrotomography for nanoscopic compositional analysis of functional

materials

2 Department of Physical Chemistry, School of Chemistry, The Raymond and Beverly Sackler Faculty of Exact Sciences and The Sackler Center for Computational Molecular and Materials ... map of the ...

Interfacial ferroelectricity by van der Waals sliding

These distinct properties at interfaces and surfaces of materials often play ... on the direction of oscillation of the light field relative to the atomic

arrangement in the material. "We take ...

Tailored Laser Fields Reveal Properties of Transparent Crystals

Friction and wear of materials accounts for enormous losses in

performance ... and mechanical behavior in a class of transition metal nitrides deposited using plasma-enhanced atomic layer deposition.

GOALI: Ultra-Low Wear Plasma Enhanced Atomic

Layer Deposited Nitride Thin Films: Exploring Processing, Structure, Properties and Mechanisms

Low-power information processing could be possible using a new method for converting between spin and

charge currents enter the cellular nucleus.

Two-dimensional materials and interfaces can convert spin current into a vortex of charge current

These distinct properties at

interfaces and surfaces of materials ... oscillation of the light field relative to the atomic arrangement in the material. "We take advantage of this dependence ...

An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

Many of the most important properties of materials in high-

technology applications are strongly influenced or even controlled by the presence of solid interfaces. In this work, leading international authorities review the broad range of subjects in this field focusing on the atomic level properties of

solid interfaces.

This handbook brings together, under a single cover, all aspects of the chemistry, physics, and engineering of surfaces and interfaces of materials currently studied in academic and

industrial research. It covers different experimental and theoretical aspects of surfaces and interfaces, their physical properties, and spectroscopic techniques that have been applied to a wide class of inorganic, organic, polymer, and

biological materials. The diversified technological areas of surface science reflect the explosion of scientific information on surfaces and interfaces of materials and their spectroscopic characterization. The large volume of experimental data on

chemistry, physics, and engineering aspects of materials surfaces and interfaces remains scattered in so many different periodicals, therefore this handbook compilation is needed. The information presented in this multivolume reference draws on

two decades of pioneering research on the surfaces and interfaces of materials to offer a complete perspective on the topic. These five volumes-Surface and Interface Phenomena; Surface Characterization and Properties; Nanostructures,

Micelles, and Colloids; Thin Films and Layers; Biointerfaces and Applications-provide multidisciplinary review chapters and summarize the current status of the field covering important scientific and technological developments made over past

decades in surfaces and interfaces of materials and spectroscopic techniques with contributions from internationally recognized experts from all over the world. Fully cross-referenced, this book has clear, precise, and wide appeal as an essential

reference source long due for the scientific community. The complete reference on the topic of surfaces and interfaces of materials The information presented in this multivolume reference draws on two decades of pioneering research Provides

multidisciplinary review chapters and summarizes the current status of the field Covers important scientific and technological developments made over past decades in surfaces and interfaces of materials and spectroscopic

techniques Contributions from internationally recognized experts from all over the world

Ceramic Materials: Science and Engineering is an up-to-date treatment of ceramic science, engineering, and applications in a

single, integrated text. Building on a foundation of crystal structures, phase equilibria, defects and the mechanical properties of ceramic materials, students are shown how these materials are processed for a broad diversity of applications in

today's society. Concepts such as how and why ions move, how ceramics interact with light and magnetic fields, and how they respond to temperature changes are discussed in the context of their applications. References to the art and history of ceramics

are included throughout the text. The text concludes with discussions of ceramics in biology and medicine, ceramics as gemstones and the role of ceramics in the interplay between industry and the environment. Extensively illustrated, the text

also includes questions for the student and recommendations for additional reading. KEY FEATURES: Combines the treatment of bioceramics, furnaces, glass, optics, pores, gemstones, and point defects in a single text Provides abundant

examples and illustrations relating theory to practical applications Suitable for advanced undergraduate and graduate teaching and as a reference for researchers in materials science Written by established and successful

teachers and authors with experience in both research and industry

The behaviour of many materials critically depends on processes at

interfaces and surfaces. This volume presents up-to-date reviews on atomic structure and properties of interfaces.

This handbook brings together, under a single cover, all aspects of the chemistry, physics, and

engineering of surfaces and interfaces of materials currently studied in academic and industrial research. It covers different experimental and theoretical aspects of surfaces and interfaces, their physical properties, and spectroscopic

techniques that have been applied to a wide class of inorganic, organic, polymer, and biological materials. The diversified technological areas of surface science reflect the explosion of scientific information on surfaces and interfaces of

materials and their spectroscopic characterization. The large volume of experimental data on chemistry, physics, and engineering aspects of materials surfaces and interfaces remains scattered in so many different periodicals, therefore this

handbook compilation is needed. The information presented in this multivolume reference draws on two decades of pioneering research on the surfaces and interfaces of materials to offer a complete perspective on the topic. These five volumes-Surface

and Interface Phenomena; Surface Characterization and Properties; Nanostructures, Micelles, and Colloids; Thin Films and Layers; Biointerfaces and Applications-provide multidisciplinary review chapters and summarize the current status

of the field covering important scientific and technological developments made over past decades in surfaces and interfaces of materials and spectroscopic techniques with contributions from internationally recognized experts from all over

the world. Fully cross-referenced, this book has clear, precise, and wide appeal as an essential reference source long due for the scientific community. The complete reference on the topic of surfaces and interfaces of materials The information

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made over past decades in surfaces and interfaces of materials and spectroscopic techniques Contributions from internationally recognized experts from all over the world.

Because of the intrinsic limits of the Si/SiO2 based industry, there is a great trend towards the monolithic integration of new materials into already well developed silicon technology. Having lasted for several decades

now, downscaling reaches the limit, in which a critical device dimension approaches the size of one atom. At this level of the miniaturization, it is not the bulk material, but the interface between the two materials that what controls the properties of

the resulting optoelectronic device. Thus, the characterization of precise atomic arrangements at different interfaces and the influence of these arrangements on the optoelectronic properties of interfaces is required. Therefore, in this study, a

combination of scanning transmission electron microscopy (STEM) techniques and density functional theory calculations was used as a research tool for the characterization of interfaces. The STEM instruments used for the study were equipped with

prototypes of spherical aberration correctors, enabling to achieve the highest resolution currently available both in space and energy. The combination of experimental and theoretical methods was applied to study interfaces between Si/GaAs,

Si/Ge, Ge/SiO2, Si/HfO2 and Si/Al2O3. As the result of the present research, a new dislocation configuration at the Si/GaAs interface was reported for the first time. The influence of this dislocation structure on the electrical properties of the

Si/GaAs interface was analyzed. Also, the transition from Si to GaAs and from Si to Ge at corresponding interfaces was described with atomic precision. For the first time, the interface between Ge and SiO2 was shown to have 'ideal' characteristics

(chemical abruptness and sharpness). This indicates the potential, both for a more successful use of Ge in high-speed devices and for advances in interface engineering to enhance performance in electronic devices. The features

of Si/HfO2 and Si/Al2O &

This book describes a body of work whose ultimate goal is to optimize the design of microbatteries. It focuses on the fundamental properties of the structure and atomic diffusion in

glassy materials which optimize the properties of the electrolyte. Experimental results and their phenomenological description of lithium borate glasses are extensively covered. Other chapters discuss the effects of barriers between the electrodes

and the electrolyte and the book culminates with a description of actual progress in making applications of these materials to batteries, sensors and other devices. Contents:Models of Atomic Diffusion (R J Elliott)A Theory of Glass Formation (R

Kerner)Structural and Vibrational Properties of B2O3 and Related Glasses (R A Barrio)Properties of Borate Glasses: Structure, Vibrational Properties and Transport Experimental Approach (M Massot)Theory of Atomic Diffusion Across Interfaces (J

Deppe)Applications of Superionic Conductors in Microbatteries and Elsewhere (M Balkanski)

Readership: Condensed matter physicists.

keywords:Diffusion;Atomic Jump Tracer Batteries, Solid State Glasses;Borates Transition

Materials;Disordered Amorphous Superionic Conductivity;Ionic Spectra;Infra-Red Raman Vibtations;Atomic