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Synopsis. Specifically dedicated to polymer and biopolymer systems, Polymer Adhesion, Friction, and Lubrication guides readers to the scratch, wear, and lubrication properties of polymers and the engineering applications, from biomedical research to automotive engineering. Author Hongbo Zeng details different experimental and theoretical methods used to probe static and dynamic properties of polymer materials and biomacromolecular systems.

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*Description: Polymer Adhesion, Friction, and Lubrication.*

Amazoncom Polymer Adhesion Friction And Lubrication polymer adhesion friction and lubrication sets forth a variety of experimental and theoretical methods such as the use of atomic force microscopy and surface forces apparatus to analyze nanotribology the books sixteen chapters also explore topics such as polymer thin films and brushes Polymer Adhesion Friction And Lubrication Amazonde Bucher

Specifically dedicated to polymer and biopolymer systems, Polymer Adhesion, Friction, and Lubrication guides readers to the scratch, wear, and lubrication properties of polymers and the engineering applications, from biomedical research to automotive engineering. Author Hongbo Zeng details different experimental and theoretical methods used to probe static and dynamic properties of polymer materials and biomacromolecular systems. Topics include the use of atomic force microscopy (AFM) to analyze nanotribology, polymer thin films and brushes, nanoparticles, rubber and tire technology, synovial joint lubrication, adhesion in paper products, bioMEMS, and electrorheological fluids.

Surface effects in adhesion, friction, wear, and lubrication

FROM THE PREFACE The surface modification of polymeric materials has been the object of a large number of investigations, but little attention has been paid to making a polymer surface frictionless or slippery, and lubricating surfaces are practically unmentioned in any books so far published, probably because of the relatively minor importance of polymer friction in industrial applications. A lubricating polymer surface is important, especially in marine and biomedical technologies. For instance, biomaterials to be used for catheterization on the urinary, tracheal, and cardiovascular tracts, or for endoscopy, should have a surface with good handling

characteristics when dry and which preferably becomes slippery upon contact with body liquids. Such a low-friction surface must enable easy insertion and removal of the device from a patient. It would further prevent mechanical injury to the mucous membranes and minimize discomfort to the patient. Earlier approaches to providing a low-friction surface were mostly simple applications involving lubricants such as lidocaine jelly, silicone oil, or non-permanent coating with low-friction materials such as polyethylene or fluoroplastics. However, these substances cannot maintain a high degree of slipperiness for the required duration of time, due to the fact that they leach or disperse into the surrounding body fluids. The aim of this book is to describe the principle of lubrication, to outline a variety of methods for attaining a lubricous surface, and to describe the characteristics and properties of such lubricous surfaces. The technology for surface modification of polymers by grafting will find other applications than for lubrication, such as for improvement of the interfacial adhesion in polymer composites.

This book deals with the new and now-expanding field of friction, wear, and other surface-related mechanical phenomena for polymers. Polymers have been used in various forms such as bulk, films, and composites in applications where their friction, wear resistance, and other surface-related properties have been effectively utilized. There are also many examples in which polymers have performed extremely well, such as in tyres, shoes, brakes, gears, bearings, small moving parts in electronics and MEMS, cosmetics/hair products, and artificial human joints. Around the world, much research is currently being undertaken to develop new polymers, in different forms, for further enhancing tribological performance and for finding novel applications. Keeping in view the importance of tribology of polymers for research and technology as well as the vast literature that is now available in research papers and review articles, this timely book brings together a wealth of research data for an understanding of the basic principles of the subject. Contents: Bulk Polymers: Adhesion and Friction of Polymers Tribophysical Interpretation of Polymer Sliding Mechanisms Scaling Effects in Tribotesting of Polymers Biopolymer Tribology Reinforced Polymers: Wear of Polytetrafluoroethylene and PTFE Composites Mechanical and Tribological Behaviour of Polymers Filled with Inorganic Particulate Fillers The Sliding Wear of Polypropylene and Its Blends Brake Friction Materials Polymer Films: Mechanical Properties of Thin Polymer Films Within Contacts AFM Testing of Polymeric Resist Films for Nanoimprint Lithography and other papers Readership: Engineering professionals working on polymers for designing bearing materials; managers and researchers in materials laboratories; graduate students in the area of materials/tribology. Keywords: Polymer; Tribology; Wear; Friction; Scratching Key Features: Covers, for the first time, all areas of polymer tribology (bulk, films, composites, and applications) in one comprehensive book Describes new applications for polymers, such as in microscale and nanoscale machines where surface properties or tribology play a crucial role in the durability and performance of the machine Compiles various works in this area into one volume, and includes opinions or contributions from some of the world's leading authorities in this field Reviews: "This book brings together a vast wealth of research data and a fundamental understanding of the basic principles in this important research area. Those working in the field of polymer tribology will find it helpful in learning about the most recent developments. Those new to the area will find its many chapters on the fundamentals of polymer tribology very instructive." IEEE Electrical Insulation Magazine

With the ever-increasing amount of research being published it is a Herculean task to be fully conversant with the latest research developments in any field, and the arena of adhesion and adhesives is no exception. Thus, topical review articles provide an alternate and very efficient way to stay abreast of the state-of-the-art in many subjects representing the field of adhesion science and adhesives. Based on the success and the warm reception accorded to the premier volume in this series "Progress in Adhesion and Adhesives" (containing the review articles published in Volume 2 (2014) of the journal Reviews of Adhesion and Adhesives (RAA)), volume 2 comprises 14 review articles published in Volume 4 (2016) of RAA. The subjects of these 14 reviews fall into the following general areas: 1. Surface modification of polymers for a variety of purposes. 2. Adhesion aspects in reinforced composites 3. Thin films/coatings and their adhesion measurement 4. Bioadhesion and bio-implants 5. Adhesives and adhesive joints 6. General adhesion aspects The topics covered include: surface modification of natural fibers for reinforced polymer composites; adhesion of submicrometer thin metal films; surface treatments to modulate bioadhesion; hot-melt adhesives from renewable resources; particulate-polymer composites; functionally graded adhesively bonded joints; fabrication of nano-biodevices; effects of particulates on contact angles, thermal stresses in adhesively bonded joints and ways to mitigate these; laser-assisted electroless metallization of polymer materials; adhesion measurement of coatings on biodevices/implants; cyanoacrylate adhesives; and adhesion of green flame retardant coatings onto polyolefins.

In the field of tribology, the wear behaviour of polymers and composite materials is considered a highly non-linear phenomenon. Wear of Polymers and Composites introduces fundamentals of polymers and composites tribology. The book suggests a new approach to explore the effect of applied load and surface defects on the fatigue wear behaviour of polymers, using a new tribometer and thorough experiments. It discusses effects of surface cracks, under different static and cyclic loading parameters on wear, and presents an intelligent algorithm, in the form of a neural network, to map the relationship between wear rate and relevant factors. Using the aforementioned method leads to more accurate and cost effective prediction of surface fatigue wear rates, under different service conditions. The first three chapters of the book introduce polymers and composite materials tribology, followed by three chapters that cover testing in wear, applied load and contact pressure and surface defects. The remaining chapter moves on to predicting wear of polymers, and concludes by discussing questions and problems. Prepares senior undergraduates as well as postgraduate students Focuses on the factors influencing wear of polymers and composites Contains detailed design of Tribometer, wear test procedures and detailed dataset of more than 50 experimental wear tests Introduces an artificial neural network approach as one of the recently developed wear prediction models.

Superlubricity is defined as a sliding regime in which friction or resistance to sliding vanishes. It has been shown that energy can be conserved by further reducing/removing friction in moving mechanical systems and this book includes contributions from world-renowned scientists who address some of the most fundamental research issues in overcoming friction. Superlubricity reviews the latest methods and materials in this area of research that are aimed at removing friction in nano-to-micro scale machines and large scale engineering components. Insight is also given into the atomic-scale origins of friction in general and superlubricity while other chapters focus on experimental and practical aspects or impacts of superlubricity that will be very useful for broader industrial community. \* Reviews the latest fundamental research in superlubricity today \* Presents 'state-of-the-art' methods, materials, and experimental techniques \* Latest developments in tribomaterials, coatings, and lubricants providing superlubricity

Sustainable practices within the mining and energy sectors are assuming greater significance due to uncertainty and change within the global economy and safety, security, and health concerns. This book examines sustainability issues facing the mining and energy sectors by addressing six major themes: Mining and Mineral Processing; Metallurgy and Recycling; Environment; Energy; Socioeconomic and Regulatory; and Sustainable Materials and Fleets. Emphasizing an integrated transdisciplinary approach, it deliberates on optimizing mining productivity and energy efficiency and discusses integrated waste management practices. It discusses risk management, cost cutting, and integration of sustainable practices for long-term business value. It gives a comprehensive outlook for sustainable mineral futures from academic and industry perspectives covering mine to mill optimization, waste, risk and water management, improved efficiencies in mining tools and equipment, and performance indicators for sustainable developments. It covers how innovation and research underpin management of natural resources including sustainable carbon management. •Focuses on mining and mineral processing, metallurgy and recycling, the environment, energy, socioeconomic and regulatory issues, and sustainable materials and fleets. •Describes metallurgy and recycling and uses economic, environmental and social parameter analyses to identify areas for improvement in iron, steel, aluminium, lead, zinc, copper, and gold production. •Discusses current research on

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mining, performance indicators for sustainable development, sustainability in mining equipment, risk and safety management, and renewable energy resources •Covers alternative and conventional energy sources for the mineral sector as well water treatment and remediation and energy sustainability in mining. •Provides an overview of sustainable carbon management. •Offers an interdisciplinary approach with international focus.

This title is designed to provide a clear and comprehensive overview of tribology. The book introduces the notion of a surface in tribology where a solid surface is described from topographical, structural, mechanical, and energetic perspectives. It also describes the principal techniques used to characterize and analyze surfaces. The title then discusses what may be called the fundamentals of tribology by introducing and describing the concepts of adhesion, friction, wear, and lubrication. The book focuses on the materials used in tribology, introducing the major classes of materials used, either in their bulk states or as coatings, including both protective layers and other coatings used for decorative purposes. Of especial importance to the tribology community are sections that provide the latest information on Nanotribology, Wear, Lubrication, and Wear-Corrosion: Tribocorrosion and Erosion-Corrosion.

This handbook is a collection of authoritative information in the new and expanding field of polymer tribology. It brings together various research topics in the field of polymer tribology in a single volume, and provides relevant data in polymer tribology for research and industrial applications. The book's chapters are written by active, world-renowned researchers in the field. Subjects covered in this book range from the fundamentals of polymer tribology to highly applied topics such as machine element design (bearing and gears), hip prosthetic and microsystems applications. Readers in the field of tribology, in general, and polymer tribology, in particular, will find it very useful as it covers nearly all aspects of polymer tribology. Academics creating new courses based on polymer tribology will also find this book's comprehensive coverage valuable. Researchers will find this book a ready source of the state-of-the-art in the field of polymer tribology.

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