Polymer Surface Modification Relevance To Adhesion

#polymer surface modification #adhesion enhancement #surface treatment polymers #polymer bonding technology #material surface engineering

Explore the profound relevance of polymer surface modification in optimizing adhesion across various applications. Understanding how engineered polymer surfaces directly influence bonding strength is crucial for advancements in coatings, composites, and biomedical technologies, enhancing performance and durability.

Polymer Surface Modification: Relevance to Adhesion

The topic of polymer surface modification is of tremendous contemporary interest because of its critical importance in many and varied technological applications where polymers are used. Currently there is brisk research activity in unraveling the mechanisms of surface modification and finding ways to prolong the life of surface treatment. Also there is acute interest and need to devise new, improved and economical means to modify polymer surfaces. This book is divided into three parts as follows: Part 1: Surface Modification Techniques; Part 2: Interfacial Aspects and Adhesion; Part 3: General Papers. The topics covered include : various techniques for surface modification including plasma (both vacuum and atmospheric pressure), ozone, photografting, UV photo-oxidation, laser, use of charged particles and others for a variety of polymers; longevity of surface treatment; hydrophobic recovery; fabrication of high-density polymer nano-dots; immobilization of organometallic catalysts on textile carrier materials; polymer membrane antifouling properties; electroless metallization of polymers; effects of surface modification on interfacial shear strength of composites, cord/rubber adhesion, adhesion of UV-curable coatings and attachment of hyperbranched polymers; plasma polymerization; block copolymers; application of plasma technology in decontamination of heat-sensitive polymer surfaces. In essence this book reflects the current state-of-the-knowledge in the arena and represents the work of many renowned scientists and technologists. It should be of interest to anyone with a desire or need to learn the latest R&D activity in this domain and the information contained here should be very valuable in deciding the optimum surface modification technique for his/her particular requirements.

Polymer Surface Modification: Relevance to Adhesion, Volume 2

This book chronicles the proceedings of the Second International Symposium on Polymer Surface Modification: Relevance to Adhesion held Newark, New Jersey, May 24--26, 1999. Polymeric materials are intrinsically not very adhesionable and this necessitates their surface treatment to enhance their

adhesion characteristics to other materials. Since the first symposium on this topic, held in 1993, there has been a tremendous R&D activity in devising novel or ameliorating the existing techniques for surface modification of polymers. This volume contains a total of 32 papers, which have been rigorously peer-reviewed and suitably revised before inclusion in this volume. The book is divided into three parts as follows. Part 1: Plasma Surface Modification Techniques; Part 2: Other/Miscellaneous Surface Modification Techniques; and Part 3: General Papers. The topics covered include: plasma surface modification of a variety of polymers using various plasma gases; atmospheric plasma system; surface functionalization; ultrahydrophobic polymeric surfaces; metallization of plasma treated polymers; surface modification of polymers via molecular design for adhesion promotion; wet chemical methods for polymer surface modification; laser surface modification of various polymers; UV/ozone treatment; surface and interface studies of treated polymer surfaces by an array of techniques; bioadhesion of polymeric biomaterials to tissue; polymer-fiber systems; and plasma deposited coatings.

Polymer Surface Modification: Relevance to Adhesion

This book documents the proceedings of the Fourth International Symposium on Polymer Surface Modification: Relevance to Adhesion held under the auspices of MST Conferences, LLC in Orlando, FL, June 9-11, 2003. Polymers are used for a variety of purposes in a host of technological applications and even a cursory look at the literature will evince that currently there is tremendous interest and R&D activity in the area of polymer surface modification to attain their desired surface characteristics, particularly to enhance their adhesion. This volume contains a total of 25 papers which were properly peer reviewed, revised and edited. So this book is not merely a collection of papers, rather represents the highest standard of publication. The book is divided into three parts: 1. Plasma Surface Modification Techniques; 2. Other / Miscellaneous Surface Modification Techniques; and 3. General Papers. The topics covered include: low pressure plasma surface modification of a variety of polymers using various gases; atmospheric pressure plasma treatment; improvement of stain release properties of fabrics; modification of electrostatic properties of polymers; photon-based processes for surface modification of fibers; excimer UV light treatment; excimer laser surface treatment; low-energy ion treatment; photo-grafting and photo-curing; metallization of treated polymers; chemical (wet) functionalization of polymers; adhesion of paints to thermoplastic substrates; polymer release surfaces; nanolithography in polymer films; gas barrier properties of ceramic layers on polymers; and modification of interphase layer and relevance to adhesion. This volume and its predecessors containing plentiful information should serve as a comprehensive source of latest R&D activity in the highly technologically important arena of polymer surface modification. Anyone interested –centrally or peripherally– in knowing or learning about the various ways to modify polymer surfaces should find this book of immense value.

Polymer Surface Modification: Relevance to Adhesion

This book documents the proceedings of the Fifth International Symposium on this topic, held in Toronto. The book is divided into two parts: Part 1: Surface Modification Techniques; Part 2: Adhesion Improvement to Polymer Surfaces. Various ways to modify a host of polymer surfaces for a variety of purposes are covered in this book, with emphasis on latest developments. There is a tremendous current interest in devising new ways or ameliorating the existing techniques to modify polymer surfaces to attain desired characteristics because of its importance in a legion of technological areas, and all signals indicate that this interest will continue unabated. So this book should fill the need and should be a valuable addition to the literature.

Plasma Surface Modification of Polymers: Relevance to Adhesion

This book is a collection of invited papers (previously published in special issues of the Journal of Adhesion Science and Technology) written by internationally recognized researchers actively working in the field of plasma surface modification. It provides a current, comprehensive overview of the plasma treatment of polymers. In contrast to plasm

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Part 1: Surface Modification Techniques; Part 2: Interfacial Aspects and Adhesion; Part 3: General Papers. The topics covered include: various techniques for surface modification including plasma (both vacuum and atmospheric pressure), ozone, photografting, UV photo-oxidation, laser, use of charged particles and others for a variety of polymers; longevity of surface treatment; hydrophobic recovery; fabrication of high-density polymer nano-dots; immobilization of organometallic catalysts on textile carrier materials; polymer membrane antifouling properties; electroless metallization of polymers; effects of surface modification on interfacial shear strength of composites, cord/rubber adhesion, adhesion of UV-curable coatings and attachment of hyperbranched polymers; plasma polymerization; block copolymers; application of plasma technology in decontamination of heat-sensitive polymer surfaces. In essence this book reflects the current state-of-the-knowledge in the arena and represents the work of many renowned scientists and technologists. It should be of interest to anyone with a desire or need to learn the latest R&D activity in this domain and the information contained here should be very valuable in deciding the optimum surface modification technique for his/her particular requirements.

Polymer Surface Modification: Relevance to Adhesion, Volume 3

This book documents the proceedings of the Fourth International Symposium on Polymer Surface Modification: Relevance to Adhesion held under the auspices of MST Conferences, LLC in Orlando, FL, June 9-11, 2003. Polymers are used for a variety of purposes in a host of technological applications and even a cursory look at the literature will evince that currently there is tremendous interest and R&D activity in the area of polymer surface modification to attain their desired surface characteristics, particularly to enhance their adhesion. This volume contains a total of 25 papers which were properly peer reviewed, revised and edited. So this book is not merely a collection of papers, rather represents the highest standard of publication. The book is divided into three parts: 1. Plasma Surface Modification Techniques; 2. Other / Miscellaneous Surface Modification Techniques; and 3. General Papers. The topics covered include: low pressure plasma surface modification of a variety of polymers using various gases; atmospheric pressure plasma treatment; improvement of stain release properties of fabrics; modification of electrostatic properties of polymers; photon-based processes for surface modification of fibers; excimer UV light treatment; excimer laser surface treatment; low-energy ion treatment; photo-grafting and photo-curing; metallization of treated polymers; chemical (wet) functionalization of polymers; adhesion of paints to thermoplastic substrates; polymer release surfaces; nanolithography in polymer films; gas barrier properties of ceramic layers on polymers; and modification of interphase layer and relevance to adhesion. This volume and its predecessors containing plentiful information should serve as a comprehensive source of latest R&D activity in the highly technologically important arena of polymer surface modification. Anyone interested –centrally or peripherally– in knowing or learning about the various ways to modify polymer surfaces should find this book of immense value.

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Polymer Surface Modification: Relevance to Adhesion, Volume 5

The Atmospheric Pressure Plasma (APP) treatment for polymer surface modification has attracted much attention recently, owing to its advantages over other techniques and its ability to improve adhesion without tampering with polymer's bulk properties. Focusing on the utility of APP treatment for enhancing polymer adhesion, this book covers the latest development in this important and enabling technology, providing profound insights from many top researchers on the design and functions of various types of reactors, as well as current and potential applications of APP treatment.

Polymer Surface Modification

This book documents the proceedings of the Fourth International Symposium on Polymer Surface Modification: Relevance to Adhesion. This volume and its predecessors containing plentiful information should serve as a comprehensive source of latest RD activity in the highly technologically important arena of polymer surface modification. Anyone interested -centrally or peripherally- in knowing or learning about the various ways to modify polymer surfaces should find this book of immense value.

Atmospheric Pressure Plasma Treatment of Polymers

This book embodies the proceedings of the International Symposium on Polymer Surface Modification: Relevance to Adhesion, held in Las Vegas. The articles in this book were previously published in four special issues of the Journal of Adhesion Science and Technology. Polymeric materials are used for a legion of applications in a host of technological areas. However, polymers are innately hydrophobic, low surface energy materials and thus do not adhere well to other materials brought in contact. This necessitates their surface modification/treatment to render them adhesionable. The articles in this volume cover a wide array of surface modification techniques, ranging from simple to sophisticated, wet to dry, vacuum to nonvacuum for a host of polymeric materials. The topics covered include: plasma surface treatment of a number of polymers; laser surface treatment of various polymers; corona, flame, UV, ozone, UV/ozone, photochemical, photografting, chemical grafting, and chemical methods of polymer surface modification; modification of polyamide surfaces by microorganisms; effect of polymer surface modification on metal/polymer adhesion; barrier properties of surface treated polymers; ageing study of surface treated polymers; physico-chemical properties of surface-modified polymers; application of inverse gas chromatography in the characterization of polymers; and surface acoustic wave sensor to study polymer surface treatments.

Polymer Surface Modification: Relevance to Adhesion, Volume 1

This book is a collection of invited papers (previously published in special issues of the Journal of Adhesion Science and Technology) written by internationally recognized researchers actively working in the field of plasma surface modification. It provides a current, comprehensive overview of the plasma treatment of polymers. In contrast to plasma polymerization, plasma surface modification reactions do not cause thin-film deposition, and can therefore only modify the surface properties of organic substrates. Plasma surface modifications are fast, efficient methods for improving the adhesion properties and other surface characteristics of a variety of polymeric materials. The focus of this volume is on adhesion phenomena, surface properties and the surface characterization of plasma-treated materials. This book opens with a critical review of the plasma surface modification of polymers for improved adhesion. The remainder of the papers are divided into two sections, one dealing with the characterization of plasma-treated surfaces and the second concerned with various practical applications of plasma-treated surfaces

Polymer Surface Modification

POLYMER SURFACE MODIFICATION TO ENHANCE ADHESION This unique, comprehensive and groundbreaking book is the first on this important subject. Polymer Surface Modification to Enhance Adhesion comprises 13 chapters and is divided into two parts: Part 1: Energetic Treatments; and Part 2: Chemical Treatments. Topics covered include atmospheric pressure plasma treatment of polymers to enhance adhesion; corona treatment of polymer surfaces to enhance adhesion; flame surface treatment of polymers to enhance adhesion; vacuum UV photo-oxidation of polymer surfaces to enhance adhesion; optimization of adhesion of polymers using photochemical surface modification UV/Ozone surface treatment of polymers to enhance adhesion; adhesion enhancement of polymer surfaces by ion beam treatment; polymer surface modification by charged particles; laser surface modification of polymeric materials; competition in adhesion between polysort and monosort functionalized polyolefinic surfaces; amine-terminated dendritic materials for polymer surface modification; arginine-glycine-aspartic acid (RGD) modification of polymer surfaces; and adhesion promoters for polymer surfaces. Audience The book will be of great interest to polymer scientists, surface scientists, adhesionists, materials scientists, plastics engineers, and to those involved in adhesive bonding, packaging, printing, painting, metallization, biological adhesion, biomedical devices, and polymer composites.

Polymer Surface Modification: Relevance to Adhesion, Volume 1

Polymeric materials are used for a legion of applications in a wide array of technological areas, and their proper surface/interface characteristics are of cardinal importance for their applications. Therefore, the need to characterize polymer surfaces/interfaces and their suitable modification to impart desired characteristics is quite patent. This book chronicles the proceedings of the Symposium on Polymer Surfaces and Interfaces: Characterization, Modification and Application held as a part of the Society of Plastics Engineers Annual Technical Conference, Boston, May 7--11, 1995. The articles in this book address many aspects of polymer surfaces and interfaces. Topics covered include: various ways (chemical, photochemical, laser, flame, corona) to modify polymer surfaces; modification of contact lens surfaces; various ways to analyze/characterize polymer surfaces; metal/polymer interfaces; metal/polyimide adhesion; metal/self-assembled organic monolayer interfaces; polymer alignment layers for liquid crystals; alignment of liquid crystal surfaces; polyimide alignment layers; molecular re-orientation of polymer surfaces; plasma polymerized organic coatings; epoxy/fiber interphase; epoxy underfill materials for packaging integrated circuits; transport in polymers; polymer miscibility; and cell adhesion.

Plasma Surface Modification of Polymers

A guide to modifying and functionalizing the surfaces of polymers Surface Modification of Polymers is an essential guide to the myriad methods that can be employed to modify and functionalize the surfaces of polymers. The functionalization of polymer surfaces is often required for applications in sensors, membranes, medicinal devices, and others. The contributors?noted experts on the topic?describe the polymer surface in detail and discuss the internal and external factors that influence surface properties. This comprehensive guide to the most important methods for the introduction of new functionalities is an authoritative resource for everyone working in the field. This book explores many applications, including the plasma polymerization technique, organic surface functionalization by initiated chemical vapor deposition, photoinduced functionalization on polymer surfaces, functionalization of polymers by hydrolysis, aminolysis, reduction, oxidation, surface modification of nanoparticles, and many more. Inside, readers will find information on various applications in the biomedical field, food science, and membrane science. This important book: -Offers a range of polymer functionalization methods for biomedical applications, water filtration membranes, and food science -Contains discussions of the key surface modification methods, including plasma and chemical techniques, as well as applications for nanotechnology, environmental filtration, food science, and biomedicine -Includes contributions from a team of international renowned experts Written for polymer chemists, materials scientists, plasma physicists, analytical chemists, surface physicists, and surface chemists, Surface Modification of Polymers offers a comprehensive and application-oriented review of the important functionalization methods with a special focus on biomedical applications, membrane science, and food science.

Polymer Surface Modification to Enhance Adhesion

Polymer surface modification has been studied extensively, but relatively little attention has been paid to surface activation technologies that, when appropriately utilized, make specific polymer-based surfaces receptive to value-adding interfaces such as inks, coatings, and adhesive formulations. The aim of this book is to describe the primary polymer adhesion issues faced by manufacturers, processors,

and converters, to outline a variety of methods for attaining an appropriately activated surface, and to provide the diagnostics for various adhesion promotion issues, with troubleshooting guidelines. The second edition greatly expands the coverage of chemical plasma discharge, including technical updates and clarifications, and new developments concerning additional base materials.

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Polymer Surfaces and Interfaces

This volume documents the proceedings of the Second International Symposium on Adhesion Aspects of Polymeric Coatings held in Newark, New Jersey, May 25-26, 2000. Since the first symposium, held in 1981, there had been tremendous research activity relative to the adhesion aspects of polymeric coatings. Polymeric coatings are used for a variety of purposes. Irrespective of the intended purpose of the coating, it must adequately adhere to the underlying substrate, otherwise delamination and other undesirable phenomena occur. So the need to understand the factors which influence adhesion of polymeric coatings and to control it to a desirable level is quite patent. This volume contains a total of 13 papers, which were all properly peer reviewed, revised and edited before inclusion. Furthermore, the authors were asked to update their manuscripts, so the information contained in this book should be current and fresh. The topics covered in this book include: factors influencing adhesion of polymeric coatings; ways to improve adhesion; formation and relevance of interphase in practical adhesion; adhesion/cohesion in painted plastics; imaging of polymer surfaces; effect of substrate residue (smut) on coating process; surface treatment of metals and glass by silanes; surface modification of polyphenylene sulfide plastics; resin bonding in dentistry; measurement of internal stresses in polymeric coatings; effect of steel surface composition on adhesion of paint; wet adhesion of coatings on wood; and modified tape test to measure adhesion of coatings.

Surface Modification of Polymers

Honolulu is a most beautiful place, suitable for all occa sions. Its choice as the meeting site for the first Joint Chemical Congress between the American Chemical Society and the Chemical Society of Japan was praised by scientists from both sides. During this Congress, the International Conference on Adhesion and Adsorption of Polymers was held at the Hyatt Regency Hotel between April 2 and 5, 1979. We had speakers from ten nations presenting over forty papers related to the subject matter. It was a memorable event. Unlike our two previous adhesion symposia held in 1971 and 1975, this was the first time in the same conference that we discussed both adhesion and adsorption of polymers simultaneously. These two important phenomena are not only inter-related, but also equally important in adhesive technology as well as biochemical processes. The papers presented to this Conference deal with these two phenomena from both fundamental and practical viewpoints. Furthermore, with the advance of new surface analytical techniques, the actual, microscopic happenings at the interfaces can be pin pointed. Thus, characterization of interface became one of the major focuses of this Conference. As a result, a broad coverage of the subject matter includes statistical thermodynamics, surface physics, surface analysis, fracture mechanics, viscoelasticity, failure analysis, surface modification, adsorption kinetics, bio polymer adsorption, etc. Thanks to the diligence of our contri butors, we are now able to publish the final papers in these two volumes.

Plastic Surface Modification

In recent years, a growing number of engineering applications of light weight and energy efficient plastics can be found in high quality parts vital to the func tioning of entire equipments and structures. Improved mechanical properties, especially balance of stiffness and toughness, are among the most frequently desired features of the new materials. In addition, reduced flammability is con sidered the single most important requirement for further expansion of plastics into large volume and demanding markets such as construction and mass trans port. Production of power cables also requires flame retardant cable jacketing plastics to replace or at least to reduce consumption of environmentally unsound PVC. The two principal ways to achieve the goals mentioned above include the development of completely new thermoplastic polymers and various modifica tions of the existing ones. Development and commercialization of a new ther moplastic require mobilization of large human and financial resources, the lat ter being within the range from $100 million to $10 billion, in comparison to $100 thousand to $10 million needed to develop and commercialize polymeric mate rial with prescribed end use properties using physical or chemical modification of an existing plastic. In addition, the various markets utilizing thermoplastics demand large flexibility in material properties with only moderate volumes, at the best.

Polymer Surfaces and Interfaces: Characterization, Modification and Application

Poly mer Interface and Adhesion provides the critical basis for further advancement in thisfield. Combining the principles of interfacial science, rheology, stress analysis, and fracturemechanics, the book teaches a new approach to the analysis of long standing problemssuch as: how is the interface formed; what are its physical and mechanical properties;and how does the interface modify the stress field and fracture strength of the material.The book offers many outstanding features, including extensive listings of pertinent references,exhaustive tabulations of the interfacial properties of polymers, critical reviews ofthe many conflicting theories, and complete discussions of coupling agents, adhesion promotion,and surface modifications. Emphasis is placed on physical concepts and mechanisms,using clear, understandable mathematics.Polymer Interface and Adhesion promotes a more thorough understanding of the physical,mechanical, and adhesive properties of multiphase, polymer systems. Polymer scientistsand engineers, surface chemists, materials scientists, rheologists, as well as chemical andmechanical engineers interested in the research, development or industrial applications ofpolymers, plastics, fibers, coatings, adhesives, and composites need this important newsource book.

Adhesion Aspects of Polymeric Coatings

This book documents the proceedings of the Fourth International Symposium on Polymer Surface Modification: Relevance to Adhesion held under the auspices of MST Conferences, LLC in Orlando, FL, June 9-11, 2003. Polymers are used for a variety of purposes in a host of technological applications and even a cursory look at the literature will evince that currently there is tremendous interest and R&D activity in the area of polymer surface modification to attain their desired surface characteristics, particularly to enhance their adhesion. This volume contains a total of 25 papers which were properly peer reviewed, revised and edited. So this book is not merely a collection of papers, rather represents the highest standard of publication. The book is divided into three parts: 1. Plasma Surface Modification Techniques; 2. Other / Miscellaneous Surface Modification Techniques; and 3. General Papers. The topics covered include: low pressure plasma surface modification of a variety of polymers using various gases; atmospheric pressure plasma treatment; improvement of stain release properties of fabrics; modification of electrostatic properties of polymers; photon-based processes for surface modification of fibers; excimer UV light treatment; excimer laser surface treatment; low-energy ion treatment; photo-grafting and photo-curing; metallization of treated polymers; chemical (wet) functionalization of polymers; adhesion of paints to thermoplastic substrates; polymer release surfaces; nanolithography in polymer films; gas barrier properties of ceramic layers on polymers; and modification of interphase layer and relevance to adhesion. This volume and its predecessors containing plentiful information should serve as a comprehensive source of latest R&D activity in the highly technologically important arena of polymer surface modification. Anyone interested –centrally or peripherally– in knowing or learning about the various ways to modify polymer surfaces should find this book of immense value.

Adhesion and Adsorption of Polymers

This book contains selected contributions on surface modification to improve the properties of solid materials. The surface properties are tailored either by functionalization, etching, or deposition of a

thin coating. Functionalization is achieved by a brief treatment with non-equilibrium gaseous plasma containing suitable radicals that interact chemically with the material surface and thus enable the formation of rather stable functional groups. Etching is performed in order to modify the surface morphology. The etching parameters are selected in such a way that a rich morphology of the surfaces is achieved spontaneously on the sub-micrometer scale, without using masks. The combination of adequate surface morphology and functionalization of materials leads to superior surface properties which are particularly beneficial for the desired response upon incubation with biological matter. Alternatively, the materials are coated with a suitable thin film that is useful in various applications from food to aerospace industries.

Mineral Fillers in Thermoplastics I

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 may subjects representing the field of adhesion science and adheisves. 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 metals 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.

Polymer Interface and Adhesion

In what is an extremely practical and applicable new work, experts provide concise explanations, with examples and illustrations, of the key techniques in this important field. In each case, after basic principles have been reviewed, applications of the experimental techniques are discussed and illustrated with specific examples. Scientists and engineers in research and development will benefit from an application-oriented book that helps them to find solutions to both fundamental and applied problems. They will know that the surfaces and interfaces of polymers play an important role in most of the application areas of polymers, from moulds, foils, and composites, to biomaterials and applications in micro- and nanotechnology.

Polymer Surface Modification: Relevance to Adhesion

As the use and applications of polymers increase, so does the interactions of polymer surfaces with other materials. This updated paperback edition of this well-received, popular book presents a comprehensive approach to all aspects of polymer surfaces, from fundamental theory through applications, making it essential reading for everyone studying or working with polymers. From the Reviews of the Cloth Edition: "...both informative and a pleasure to read...the favorable reaction derives from the volume's organization and presentation of its material to ensure maximum utility." —Polymer News Divided into four comprehensive sections: physical principles of polymer surfaces, characterization, modifications of properties, and applications. Includes the most recent patent information.

Surface Modification to Improve Properties of Materials

This Festschrift documents the Proceedings of the First International Congress on Adhesion Science and Technology, held in honor of Dr. Kash Mittal on the occasion of his 50 birthday, in Amsterdam, The Netherlands, October 16-20, 1995. It contains the full accounts of the plenary and invited lectures, which are divided into the following seven parts: Part 1: Fundamental aspects of adhesion and general topics; Part 2: Contact angle, wettability and surface energetics; Part 3: Surface modification: Relevance to adhesion; Part 4: Adhesives and adhesive joints; Part 5: Adhesion aspects of polymeric coatings, and

polymer-polymer interphase; Part 6: Metal-polymer and metal-ceramic adhesion; and Part 7: General papers. The topics covered include many different aspects of adhesion science and technology, and both fundamental and applied issues are addressed. The final section of this volume gives a listing of titles, authors and affiliations of the other 185 papers which were included in the technical program of the conference.

Progress in Adhesion and Adhesives

Modification of Polymer Properties provides, for the first time, in one title, the latest information on gradient IPNs and gradient copolymers. The book covers the broad range of polymer modification routes in a fresh, current view representing a timely addition to the technical literature of this important area. Historically, blends, copolymers, or filled polymers have been developed to meet specific properties, or to optimize the cost/properties relationship. Using the gradient structure approach with conventional radical polymerization, it has been shown that it is possible to optimize properties if appropriate gradients in the composition of copolymer chains are obtained. An overview of the gradient structure approach for designing polymers has not appeared in the recent literature and this title covers the different methods used to modify properties, offering the whole range of ways to modify polymers in just one volume and making this an attractive option for a wide audience of practitioners. The approach for each chapter is to explain the fundamental principles of preparation, cover properties modification, describe future research and applications as examples of materials that may be prepared for specific applications, or that are already in use, in present day applications. The book is for readers that have a basic background in polymer science, as well as those interested in the different ways to combine or modify polymer properties. Provides an integrated view on how to modify polymer properties Presents the entire panorama of polymer properties modification in one reference, covering the essential information in each topic Includes the optimization of properties using gradients in polymers composition or structure

Polymer Surfaces and Interfaces

With the voluminous research being published, it is difficult, if not impossible, to stay abreast of current developments in a given area. The review articles in this book consolidate information to provide an alternative way to follow the latest research activity and developments in adhesion science and adhesives. 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. The 19 chapters in this Volume 6 follow the same order as the review articles originally published in RAA in the year 2020 and up to June 2021. The subjects of these 19 chapters fall in the following areas: Adhesives and adhesive joints Contact angle Reinforced polymer composites Bioadhesives Icephobic coatings Adhesives based on natural resources Polymer surface modification Superhydrophobic surfaces The topics covered include: hot-melt adhesives; adhesively-bonded spar-wingskin joints; contact angle hysteresis; fiber/matrix adhesion in reinforced thermoplastic composites; bioadhesives in biomedical applications; mucoadhesive pellets for drug delivery applications; bio-inspired icephobic coatings; wood adhesives based on natural resources; adhesion in biocomposites; vacuum UV surface photo-oxidation of polymers and other materials; vitrimers and their relevance to adhesives; superhydrophobic surfaces by microtexturing; structural acrylic adhesives; mechanically durable water-repellent surfaces; mussel-inspired underwater adhesives; and cold atmospheric pressure plasma technology for modifying polymers. Audience This book will be valuable and useful to researchers and technologists in materials science, nanotechnology, physics, surface and colloid chemistry in multiple disciplines in academia, industry, various research institutes and other organizations.

Surface Modification of Polymers

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.

Polymer Surfaces

More than 99% of all visible matter in the universe occurs as highly ionized gas plasma with high energy content. Electrical low- and atmospheric-pressure plasmas are characterized by continuous source of moderate quantities of energy or enthalpy transferred predominantly as kinetic energy of electrons. Therefore, such energetically unbalanced plasmas have low gas temperature but produce sufficient energy for inelastic collisions with atoms and molecules in the gas phase, thus producing reactive species and photons, which are able to initiate all types of polymerizations or activate any surface of low reactive polymers. However, the broadly distributed energies in the plasma exceed partially the binding energies in polymers, thus initiating very often unselective reactions and polymer degradation. The intention of this book is to present new plasma processes and new plasma reactions of high selectivity and high yield. This book aims to bridge classical and plasma chemistry, particularly focusing on polymer chemistry in the bulk and on the surface under plasma exposure. The stability of surface functionalization and the qualitative and quantitative measurement of functional groups at polymer surface are featured prominently, and chemical pathways for suppressing the undesirable side effects of plasma exposure are proposed and illustrated with numerous examples. Special attention is paid to the smooth transition from inanimate polymer surfaces to modified bioactive polymer surfaces. A wide range of techniques, plasma types and applications are demonstrated.

First International Congress on Adhesion Science And Technology---invited Papers

The surface of an object is the first thing we see or touch. Nearly every article or object we encounter at home, in industry, land transportation, aerospace, or the medical field in some way uses an adhesive, a sealant, or a decorative coating. Adhesion science provides the technology and the know-how behind these applications. Recent Advances in Adhesion Science and Technology in Honor of Dr. Kash Mittal is dedicated to Dr. Mittal’s outstanding contributions to the global adhesion community and his achievements in disseminating the science of adhesion. This Festschrift volume contains selected papers from the Special Symposium on Recent Advances in Adhesion Science and Technology held in honor of Dr. Mittal to commemorate the publication of his 100th edited book. Written by world-renowned researchers, the papers have been updated for inclusion in this volume. They offer insight into recent developments and the significant ramifications to adhesion science and adhesive technology. Nineteen articles are divided into five sections: Interfaces, Wettability, and Adhesion; Surface Modification of Polymers; Adhesion Aspects of Bio-Based Materials and Bioadhesion; Adhesives and Their Testing; and Nanomaterials and Nanocomposites. Reflecting the multidisciplinary nature of adhesion science, the topics covered include metal–polymer interfaces and ways to improve adhesion, lateral force at liquid–solid interface, particle adhesion in pharmaceutical sciences, wood joints formed without use of adhesives, reinforced polymer composites using different fillers, "green" composites, medium density fiber board surfaces for powder coating, adhesion aspects in dentistry, E. coli interactions in porous media, analysis of adhesive behavior in bonded assemblies, soy proteins as wood adhesives, carbon nanotube-based interphase sensors, and reaction of multiwalled carbon nanotubes with gaseous atoms.

Modification of Polymer Properties

POLYMER SURFACE MODIFICATION TO ENHANCE ADHESION This unique, comprehensive and groundbreaking book is the first on this important subject. Polymer Surface Modification to Enhance Adhesion comprises 13 chapters and is divided into two parts: Part 1: Energetic Treatments; and Part 2: Chemical Treatments. Topics covered include atmospheric pressure plasma treatment of polymers

to enhance adhesion; corona treatment of polymer surfaces to enhance adhesion; flame surface treatment of polymers to enhance adhesion; vacuum UV photo-oxidation of polymer surfaces to enhance adhesion; optimization of adhesion of polymers using photochemical surface modification UV/Ozone surface treatment of polymers to enhance adhesion; adhesion enhancement of polymer surfaces by ion beam treatment; polymer surface modification by charged particles; laser surface modification of polymeric materials; competition in adhesion between polysort and monosort functionalized polyolefinic surfaces; amine-terminated dendritic materials for polymer surface modification; arginine-glycine-aspartic acid (RGD) modification of polymer surfaces; and adhesion promoters for polymer surfaces. Audience The book will be of great interest to polymer scientists, surface scientists, adhesionists, materials scientists, plastics engineers, and to those involved in adhesive bonding, packaging, printing, painting, metallization, biological adhesion, biomedical devices, and polymer composites.

Progress in Adhesion and Adhesives, Volume 6

Lubricating Polymer Surfaces