AAP Research Notes on Polymer Engineering Science & Technology

Polymer Surfaces and Interfaces

Acid-Base Interactions and Adhesion in Polymer-Metal Systems

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Polymer Surfaces

Isaac C. Sanchez

Polymer Surfaces:

Polymer Surfaces and Interfaces: Characterization, Modification and Application Kash L. Mittal,2023-01-06 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 **Lubricating Polymer Surfaces** Yoshikimi Uyama,1998-04-30 A lubricating polymer surface is important especially in biomedical technologies Low friction surfaces enable easy insertion and removal of devices from patients Earlier approaches 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 This book describes the principle of lubrication outlines a variety of methods for attaining a lubricous surface and describes the characteristics and properties of such lubricous surfaces *Polymer Surfaces* Fabio Garbassi,M. Morra,Ernesto Occhiello,1994-02-15 Polymer Surfaces From Physics to Technology is divided into four main sections Firstly the origins and physical principles governing the properties of polymer surfaces are considered Next the authors discuss methods of characterization particularly spectroscopic and those connected to surface energetics *Responsive Polymer Surfaces* Danqing Liu,Dirk J. Broer,2017-07-20 Adopting an integrated approach this book covers experiments theory and emerging applications In the first part surfaces are described that change from flat to either a random corrugated or to a well structured structure while the second part deals with those surface structures integrated in the coating surface where the structures change their shape or dimension when addressed by an external trigger A variety of materials are addressed including liquid crystal polymers hydrogels hard acrylates and soft silicones The whole is rounded off by a discussion of various applications including surface controlled flows in microfluidic systems Of interest to chemists and engineers researchers in industry and academia as well as those working in the paint industry and hydrodynamics Wrinkled Polymer Surfaces C. M. González-Henríquez,Juan Rodríguez-Hernández,2019-02-14 This book presents the state of the art in

surface wrinkling including current and future potential applications in biomedicine tissue engineering drug delivery microfluidic devices and other promising areas Their use as templates flexible electronics and supports with controlled wettability and or adhesion for biorelated applications demonstrate how the unique characteristics of wrinkled interfaces play a distinguishing and remarkable role The fabrication approaches employed to induce wrinkle formation and the potential to fine tune the amplitude and period of the wrinkles their functionality and their final morphology are thoroughly described An overview of the main applications in which these buckled interfaces have already been employed or may have an impact in the near future is included Presents a detailed description of the physical phenomena and strategies occurring at polymer surfaces to produce wrinkled surface patterns Examines the different methodologies to produce morphology controlled wrinkled surface patterns by means of physical and chemical treatment methods Provides clear information on current and potential applications in flexible electronics and biomaterials which are leading the use of these materials **The Plasma Chemistry of Polymer Surfaces** Jörg Florian Friedrich,2012-02-13 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 Conjugated Polymer Surfaces and Interfaces W. R. Salaneck,S. Stafstrom,J. L. Brédas,2003-10-30 Describes the basic physics and materials science of conjugated polymers and their interfaces **Polymer Surfaces and Interfaces** Irina A. Starostina,Oleg V. Stoyanov,Rustam Ya Deberdeev,2014-05-20 This book presents the analysis of up to date techniques used for the determination of acid base properties in view of their applicability to examination of solid organic and inorganic surfaces The studies have been carried out by the authors since 1993 showing experimental data on surface properties of more than 150 polymers such as carbocatenary and heterochain polymers copolymers and their blends as well as different epoxy and rubber compositions used in adhesive joints The

adhesive ability of metal polymer systems based on epoxy compositions polyolefins and rubbers was studied as a function of absolute difference in acid base properties of adhesive and adherends and the possibility to predict adhesive interaction on this basis was experimentally verified The book shows the important role that acid base interactions play in establishing interfacial adhesive adherent contact and outlines practical recommendations regarding parameters of quantitative estimation of acid base surface properties that implies the relationship with adhesive ability in polymer metal systems Creating polymeric materials with greater strength characteristics when in contact with metals is the most important problem when adhesive joints are designed The authors obtained experimental data for thermodynamic and acid base properties of about 200 organic and inorganic surfaces that find a wide practical application These results may be used as a reference source to predict the adhesive ability of different coating systems The possibility to predict adhesive interaction of adhesive with adherend taking into account the absolute difference in their acidity and basicity was verified experimentally

Physicochemical Aspects of Polymer Surfaces K. L. Mittal,2013-03-13 This and its companion Volume 2 document the proceedings of the International Symposium on Physicochemical Aspects of Polymer Surfaces held under the auspices of the American Chemical Society in New York City August 23 28 1981 This event was sponsored by the Division of Colloid and Surface Chemistry and the Divisions of Organic Coatings and Plastics Chemistry and Industrial and Engineering Chemistry were the cosponsors The study of polymer surfaces is important from both funda mental and applied points of view The applications of polymers are legion and wheresoever polymers are used their surface char acteristics inter alia are of great concern and importance and the areas where polymers find applications range from microelec tronics to prosthetics In the last decade or so the availabil ity of various sophisticated surface analytical techniques par ticularly ESCA has been a boon in enhancing our knowledge of polymer surfaces This Symposium was designed to bring together scientists and technologists interested in all aspects of polymer surfaces to provide a forum for discussion of various ramifications of poly mer surfaces to discover the latest developments to provide an opportunity for cross pollination of ideas and to highlight areas which are in astate of rapid development and those which need intensified efforts If the comments from attendees is any barometer of the success of an event then this Symposium was a grand success and the above objectives were amply fulfilled Polymer Surfaces, Interfaces And Thin Films Alamgir Karim,Sanat Kumar,2000-04-19 The theoretical and experimental study of polymers polymer surfaces and thin films has undergone a revolution in the last 25 years This book captures recent advances in this field It covers equilibrium aspects kinetics and reactions at interfaces It is aimed not only at a research audience but also at beginners **Physics of Polymer Surfaces and Interfaces** Isaac C. Sanchez,2013-10-22 Physics of Polymer Surfaces and Interfaces emphasizes current theoretical ideas and modern experimental tools for characterizing the physical properties of polymer surfaces and interfaces Foremost are their important roles in polymer technologythroughthe processes of wetting adhesion adsorption and through their effect on the kinetics of phase separation and mechanical mixing of molten

polymers Each of the 14 chapters in this book stands as a mini review of a specific subject Thisup to date compendium of the most significant theoretical and experimental works provides a scientific understanding of the physics of polymer interfaces and surfaces and will aid scientists in planning and interpreting new results *Characterization of Metal and Polymer Surfaces V2* Lieng-Huang Lee,2012-12-02 Characterization of Metal and Polymer Surfaces Volume 2 Polymer Surfaces presents the proceedings of the Symposium on Advances in Characterization of Metal and Polymer Surfaces held in New York on April 5 8 1976 This book provides information pertinent to surface science and discusses the applications of surface analyses to polymer technology Organized into four parts encompassing 21 chapters this volume starts with an overview of the measurement of binding energies and chemical shifts which remain a relevant aspect of electron microscopy for organic and inorganic compounds This text then explores the capability of electron spectroscopy for chemical analysis ESCA as a spectroscopic tool that enables the features of structure and bonding in surface subsurface and bulk regions of polymer systems to be elaborated Other chapters consider the surface and interfacial properties of polymers which are significant in various biomedical applications This book is a valuable resource for analytical and polymer chemists **Physicochemical Aspects of Polymer Surfaces** K. L. Mittal,1983 Plasma Surface Modification of Polymers: Relevance to Adhesion Kash L. Mittal,M.,Lyons,2014-04-29 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

Polymer Surfaces ,1998 Polymer Surfaces B. W. Cherry,1981-01-29 The aim of this 1981 book designed for senior undergraduates postgradutes and professionals is to draw together in one unified presentation a number of the phenomena associated with polymer surfaces The author begins by describing the theory of surface tension in terms of intermolecular forces and then goes on to consider the practical problem of the factors involved when a liquid wets a polymeric surface and forms a bond to it An account of polymeric adhesives and their different spheres of application follows and an examination of the mechanism of failure of adhesive joints leads to a discussion of joint design for optimum strength and environmental resistance A chapter on friction is closely related to that on adhesion and the final chapter is devoted to specific frictional mechanisms associated with high hysteresis polymers as well as an introductory discussion of wear *The Plasma Chemistry of Polymer Surfaces* Jörg Friedrich,2012-05-29 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 *Polymer Surface Characterization* Luigia Sabbatini,Elvira De Giglio,2022-01-19 This fully updated edition provides a broad approach to the surface analysis of polymers being of high technological interest Modern analytical techniques potential applications and recent advances in instrumental apparatus are discussed The self consistent chapters are devoted to spectroscopic and microscopic techniques which represent powerful tools for the characterization of morphology and chemical physical mechanical properties of polymer surfaces interfaces and thin fi lms Selection of techniques which can properly address very shallow depth of surfaces spanning from few angstroms to tens of nanometers Interaction of polymer surfaces with their surroundings is pointed out as a critical issue for specifi c applications *Polymer Surface Modification to Enhance Adhesion* K. L. Mittal,Anil N. Netravali,2024-04-02 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 Surfaces David T. Clark,W. J. Feast,1978

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