

Friedrich Rudolf Schwarzl

Polymer- mechanik

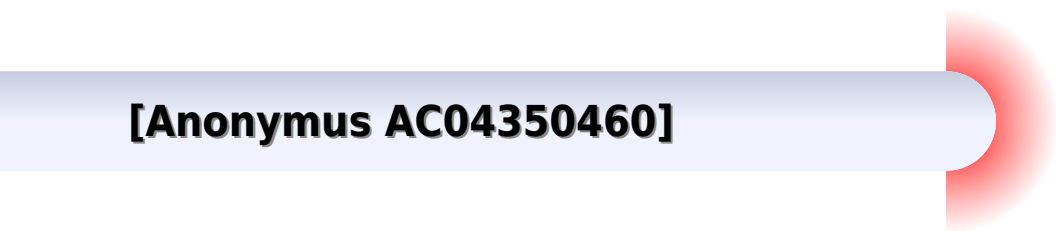
Struktur und mechanisches
Verhalten von Polymeren



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Stabilization of Polymeric Materials Hans Zweifel, 2012-12-06 Plastics are used worldwide in everyday life e.g. as food packaging, electronics, construction, automotive parts and household appliances. To produce these products with the desired service lifetimes, the use of suitable stabilizers is necessary. This book provides a concise and comprehensive overview of the basic mechanisms of plastic degradation processes caused by heat and light. At its core is a detailed description of the stabilization of different polymers, including an explanation of stabilization mechanisms and the influence of commonly used additives such as fillers, flame retardants and pigments on the stability of plastic. Every polymer scientist, material technologist or application engineer dealing with the design of the properties of plastics will benefit from this new overview.

Polymermechanik Friedrich R. Schwarzl, 2013-03-12 Das Buch gibt einen verständlichen Überblick der Zusammenhänge zwischen Molekularprozessen und mechanischen Eigenschaften polymerer Substanzen. Der Autor behandelt den Aufbau und die Struktur von Polymeren von einem physikalischen Standpunkt aus. Er stellt die mechanischen und thermischen Eigenschaften der Kunststoffe als Konstruktionsmaterialien, das Deformationsverhalten von vernetzten Kautschuken und das Fließverhalten von Polymerschmelzen verständlich dar. Dazu leitet er die zugrundeliegenden Theorien von der Basis her ab und veranschaulicht die Zusammenhänge durch experimentelles Erfahrungsmaterial. Das Buch wendet sich an Studenten der Kunststofftechnik mit einer Grundausbildung in Physik, Chemie und Mathematik. Es bietet dem Ingenieur ein bleibendes Rüstzeug für die technische Anwendung von Kunststoffen. A Modern Course in Transport Phenomena David C. Venerus, Hans Christian Öttinger, 2018-03-15 This advanced text presents a unique approach to studying transport phenomena. Bringing together concepts from both chemical engineering and physics, it makes extensive use of nonequilibrium thermodynamics, discusses kinetic theory and sets out the tools needed to describe the physics of interfaces and boundaries. More traditional topics such as diffusive and convective transport of momentum, energy and mass are also covered. This is an ideal text for advanced courses in transport phenomena and for researchers looking to expand their knowledge of the subject. The book also includes novel applications such as complex fluids, transport at interfaces and biological systems. Approximately 250

exercises with solutions included separately designed to enhance understanding and reinforce key concepts End of chapter summaries **Lochleibung von Polymeren** Thomas Neff,2000 Kleinprüfstäbe zur Charakterisierung der mechanischen Eigenschaften thermoplastischer Polymere Eiad Kabaha,2005 **Characterization of Laminated Safety Glass**

Interlayers Miriam Schuster,2022-11-19 Laminated safety glass enables the safe construction of transparent structures The mechanical behaviour depends on the polymeric interlayer both in the intact and in the post fracture state In the present work the mechanical behaviour of ethylene vinyl acetate based EVA and ionoplastic interlayers is investigated for the intact laminated safety glass condition In particular the influence of the semi crystalline structure on the stiffness behaviour is studied with X Ray Diffraction Differential Scanning Calorimetry and Dynamic Mechanical Thermal Analysis The studies on the mechanical behaviour of the interlayer in the fractured laminated safety glass were carried out with polyvinyl butyral based PVB interlayers First the temperature and frequency time dependent linearity limits are determined in Dynamic Mechanical Thermal Analyses second the nonlinear viscoelastic material behaviour is investigated with tensile relaxation tests at different temperatures and strain levels *Beyond Equilibrium Thermodynamics* Hans Christian

Öttinger,2005-04-29 *Beyond Equilibrium Thermodynamics* fills a niche in the market by providing a comprehensive introduction to a new emerging topic in the field The importance of non equilibrium thermodynamics is addressed in order to fully understand how a system works whether it is in a biological system like the brain or a system that develops plastic In order to fully grasp the subject the book clearly explains the physical concepts and mathematics involved as well as presenting problems and solutions over 200 exercises and answers are included Engineers scientists and applied mathematicians can all use the book to address their problems in modelling calculating and understanding dynamic responses of materials **Current Perspectives and New Directions in Mechanics, Modelling and Design of**

Structural Systems Alphose Zingoni,2022-09-02 *Current Perspectives and New Directions in Mechanics Modelling and Design of Structural Systems* comprises 330 papers that were presented at the Eighth International Conference on Structural Engineering Mechanics and Computation SEMC 2022 Cape Town South Africa 5 7 September 2022 The topics featured may be clustered into six broad categories that span the themes of mechanics modelling and engineering design i mechanics of materials elasticity plasticity porous media fracture fatigue damage delamination viscosity creep shrinkage etc ii mechanics of structures dynamics vibration seismic response soil structure interaction fluid structure interaction response to blast and impact response to fire structural stability buckling collapse behaviour iii numerical modelling and experimental testing numerical methods simulation techniques multi scale modelling computational modelling laboratory testing field testing experimental measurements iv design in traditional engineering materials steel concrete steel concrete composite aluminium masonry timber v innovative concepts sustainable engineering and special structures nanostructures adaptive structures smart structures composite structures glass structures bio inspired structures shells membranes space structures

lightweight structures etc via the engineering process and life cycle considerations conceptualisation planning analysis design optimization construction assembly manufacture maintenance monitoring assessment repair strengthening retrofitting decommissioning Two versions of the papers are available full papers of length 6 pages are included in the e book while short papers of length 2 pages intended to be concise but self contained summaries of the full papers are in the printed book This work will be of interest to civil structural mechanical marine and aerospace engineers as well as planners and architects

Lackeigenschaften messen und steuern Georg Meichsner, Thomas G. Mezger, Jörg Schröder, 2016-08-26 Um die speziellen Funktionen und Eigenschaften moderner Beschichtungen zu optimieren ist ein Verständnis ihrer physikalisch chemischen Zusammenhänge unerlässlich Genau dieses Verständnis schaffen die Autoren dieses Standardwerkes nun bereits in der zweiten Auflage Sie vermitteln wichtiges Basiswissen in den Bereichen Rheologie Grenzflächen und Kolloide und schlagen konsequent den Bogen von der Theorie hin zur anwendungstechnischen Praxis Ein unverzichtbares Lehrbuch für Lackingenieure Chemiker und Techniker *Kunststoffpraxis: Eigenschaften*, 1999 *Zum Stofftransport schwer flüchtiger Additive in Polymerbeschichtungen - Untersuchungen mit Hilfe der konfokalen Mikro-Raman-Spektroskopie* Max Müller, 2014-05-14 Schwerpunkt dieses Buchs ist es den Einfluss von schwer flüchtigen Additiven auf die Mobilität von Lösungsmitteln zu quantifizieren sowie die Mobilität der Additive in Polymersystemen zu bestimmen Ausgangspunkt hierfür war die Hypothese dass sich Ficksche Diffusionskoeffizienten einzelner Spezies in Polymersystemen durch Anpassung von Simulationsrechnungen an gemessene Beladungsprofile zu verschiedenen Zeitpunkten eines

Konzentrationsausgleichsprozesses bestimmen lassen **Polymer Characterization Techniques and Their Application to Blends** George P. Simon, 2003 This book aims to introduce the reader to a wide range of polymer characterization techniques including thermal rheology mechanical relaxational scattering and spectroscopic analysis In addition to discussing the techniques and their experimental considerations in general the chapters will show how the techniques are applied to polymer systems and how the data obtained is analyzed and interpreted In order to connect each technique to applications each chapter explains the use of the technique in the popular application of polymer blends The blending of polymers continues to be a major area of polymer research in academia and industry and in addition to its instructive role each chapter serves as a review of the blend literature as relevant to a polymer blends researcher *Über den Wirkmechanismus von Polyethylenglykol als Additiv zur Gefügeverdichtung im Rotationsformverfahren* Rohnstock, Falk, 2018-01-31 Eines der Hauptprobleme beim Rotationsformen sind verbleibende eingeschlossene Luftblasen die die Sinterzeit verlängern und die Festigkeit aber auch die Ästhetik des Bauteils beeinträchtigen Überraschenderweise konnten Kulikov und Kollegen 2009 zeigen dass der Zusatz einer geringen Menge von Polyethylenglykol PEG den Sinterprozess erheblich beschleunigt und den Anteil verbleibender Luftblasen drastisch reduziert In der vorliegenden Arbeit wird der Wirkmechanismus von PEG untersucht der sich im Wesentlichen auf die geringere Gaslöslichkeit der Polymerschmelze bei

PEG Zusatz zur ckf hren l sst sowie das Potenzial der dadurch m glichen Verbesserung der mechanischen Eigenschaftswerte Rheologischen Untersuchungen zeigen dass PEG die Viskosit t von LLDPE nur bei niedrigen Temperaturen minimal absenkt Jedoch ist die Viskosit tsabnahme nicht ausreichend um einen schnelleren Sinterfortschritt herbeizuf hren 2 Partikel Sinterversuche die sich mit dem Modell von Bellehumeur hervorragend beschreiben lassen belegen jedoch einen gesteigerten W rmetransport bei PEG Zusatz Sinterexperimenten mit Haufwerken aus LLDPE Partikeln und PEG Zusatz zeigen dass die Wirkung des PEGs umgehend nach dem Aufschmelzen des LLDPEs eintritt Das PEG schmilzt bei niedrigeren Temperaturen auf als das LLDPE und benetzt beim Aufschmelzen die LLDPE Partikel Dadurch wird Luft aus den Pulverzwischenr umen herausgedr ckt und der Luftanteil der von der Schmelze beim Aufschmelzen in Form von Blasen eingeschlossen wird ist geringer Bei einer weiteren Zunahme der Temperatur erh ht sich die Gasl slichkeit bzw die S ttigungskonzentration der Polymerschmelze Als Folge des niedrigeren Luftanteils ist die Schmelze unters ttigt und die Luft in den verbliebenen Blasen diffundiert schneller in die Schmelze Die zeitliche Vermessung des Blasendurchmessers und dessen mathematische Beschreibung mit dem Modell von Gogos zeigen dass der S ttigungsgrad der Polymerschmelze die treibende Kraft bei der Blasendiffusion ist und die Lebensdauer einer eingeschlossenen Luftblase im Rotationsformprozess ma geblich bestimmt Dies belegen auch Sinterversuche mit unters ttigten LLDPE Schmelzen die bei partiellem Vakuum durchgef hrt wurden S ttigungsrade von 70 bis 80 % f hren zu einem blasenfreien Gef ge F r eine Steigerung der Effektivit t des Rotationsformprozesses gibt es danach zwei M glichkeiten n mlich PEG Zusatz oder die Anwendung eines partiellen Vakuums w hrend des Sintervorgangs PEG Zusatz zeigt bereits in sehr geringen Massenanteilen eine signifikante Verbesserung der mechanischen Eigenschaften in rotationsformenden und sinternden Herstellungsverfahren So kann beim Rotationsformen mit der Zugabe von 0 2 wt % PEG die Kerbschlagz higkeit um 33 % der Zugmodul um 23 % die Streckspannung um 5 % und die Bruchdehnung um 83 % gesteigert werden Die Produktivit t des Rotationsformverfahrens kann somit je nach Bauteil um ca 20 30 % gesteigert bzw 30 40 % der Heizenergie eingespart werden Auch die Anwendung eines partiellen Vakuums von 700 mbar f hrt zu einer deutlichen Steigerung der mechanischen Eigenschaften So konnten z B die Kerbschlagz higkeit um 15 % das Zugmodul um 7 % die Streckspannung um 9 % und die Bruchdehnung um 71 % erh ht werden A major problem in rotomolding are bubbles of entrapped air which not only reduce the mechanical strength and extend the processing time but also affect the aesthetic appeal of the shapes produced Surprisingly Kulikov and colleagues 2009 demonstrated that a small amount of polyethylene glycol PEG added to the polymer accelerates the sintering and drastically reduces the number of air bubbles The objective of the current work is to explain why PEG is so effective in the sintering process and to explore the resulting improvements of the mechanical properties Rheological measurements show a slight reduction of the viscosity at low tempera tures due to the addition of PEG However the viscosity decrease is not sufficient to enhance the sintering process On the other hand two particles sintering experiments which can be described

excellently with the Bellehumeur model show an increased heat transfer by adding PEG Sinter experiments using powder beds of LLDPE particles with PEG added demonstrate that the effect of the PEG occurs immediately after the melting of LLDPE PEG melts at lower temperatures than LLDPE and wets the LLDPE particles As a result air is forced out of the powder bed and the fraction of entrapped gas which is enclosed by the polymer melt is smaller The solubility of gases and correspondingly the saturation concentration of air in the polymer melt increases with increasing temperature As a result of the lower gas fraction entrapped in bubbles the gas concentration absorbed by the polymer melt is below saturation and the air in the remaining bubbles diffuses faster into the melt Measurements of the time dependence of bubble diameters in the melt were performed and by use of the Gogos model it could be shown that the degree of gas saturation of the polymer melt is the driving force in the bubble diffusion process during the sintering process and determines the life time of enclosed gas bubbles This is also confirmed by sintering experiments with unsaturated LLDPE melts which were carried out under partial vacuum and lead to shapes without any air bubbles According there are two possibilities for increasing the efficiency of the rotomolding process either by adding PEG or by the application of a partial vacuum during sintering Even small concentrations of PEG show a significant improvement of the mechanical properties in the sintering process The impact strength can be increased by 33 % the tensile modulus by 23 % the yield stress by 5 % and the elongation to fracture by 83 % Depending on the shape produced the productivity of the rotomolding process can be increased by up to 20 30 % or up to 30 40 % of heating energy can be saved The application of a partial vacuum of 700 mbar also leads to a significant increase in the mechanical properties For example the impact strength could be increased by 15% the tensile modulus by 7 % the yield stress by 9 % and the elongation to fracture by 71 %

[Kunststoffpraxis / Konstruktion] ; Kunststoffpraxis : wirtschaftliche Verarbeitung, bewährte Konstruktionslösungen, technischer Vorsprung. Konstruktion [Anonymus AC04350460],1999 **Sol-Gel Nanocomposites** Massimo Guglielmi,Guido Kickelbick,Alessandro Martucci,2014-07-05 This book provides comprehensive coverage of nanocomposite materials obtained by the sol gel method from synthesis to applications and including design tools for combining different properties Sol gel nanocomposites are of great interest in meeting processing and application requirements for the development of multifunctional materials These materials are already commercialized for a number of applications from scratch resistant and anti adhesive coatings to optical materials with active and passive properties Biomedical applications holographic recordings fuel cells and hydrogen storage resists and catalysts are among the potential uses The novel mechanical optical and electronic properties of nanocomposite materials depend not only on the individual component materials but also on their morphology and nanoscale interfacial characteristics Sol gel is a highly versatile method for obtaining both the matrix and the filler of the nanocomposite and for chemically adjusting the interface to optimize structure and properties Although nanocomposites are widely discussed in the literature the focus has been mainly on polymer nanocomposites This book addresses nanocomposites based on inorganic or hybrid

organic inorganic matrices with an emphasis on the scientific principles which are the basis for nanocomposite sol gel synthesis and applications A didactic approach is followed with different topics developed from a fundamental point of view together with key examples and case studies First comprehensive treatment of nanocomposites obtained by sol gel methods Focuses on nanocomposites with inorganic and hybrid organic inorganic matrices Describes design tools to optimize structure and properties for various applications Covers synthesis processing characterization and modeling Uses first principles to describe the influence of interfacial characteristics on materials properties Presents case studies for both films and bulk applications Provides examples of products on the market with descriptions of the scientific principles at the base of their success Includes contributions from recognized leaders in this multidisciplinary area

Materials Reliability in Microelectronics ,1999 **Materials Reliability in Microelectronics VIII** John C. Bravman,1998 *Nachrichten aus Chemie, Technik und Laboratorium* ,1990

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