Structure Characterization of Cold Drawn High Density Polyethylene Thin Film

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Abstract:
This work throws light to study the changes of optical birefringence for cold drawn high density polyethylene (HDPE) thin film at different stresses. A stress-strain device connected to a scattering optical system was used to investigate the dynamical behavior of opto-mechanical properties at room temperature (27 degrees C +/- 1 degrees C). Some structural parameters, optical and mechanical orientation factors, f(theta), f(2)(theta), f(4)(theta), f(6)(theta), F(av), P(2)(theta), P(4)(theta), f(c), and f(m), were calculated. Also, the distribution segments at an angle (theta), the number of random links per chain (N(1)), the number of chains per unit volume (N(c)), and the average work per chain W' were calculated. The average value of the maximum birefringence was evaluated. The obtained studies demonstrate changes to the molecular orientation functions and evaluated micro structural parameters as a result of the applied cold-drawing process on (HDPE) thin film. Relationships between the calculated parameters and draw ratios were presented for illustration. (C) 2011 Wiley Periodicals, Inc. J Appl Polym Sci 122: 2026-2032, 2011

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Publisher: Academic Press, New Yorka

Some Parameter Characteristics of Thermally Treated Viscose Fibers
Author(s): Fouda, IM (Fouda, I. M.)[1] ; Oraby, AH (Oraby, A. H.)[1] ; Seisa, EA (Seisa, E. A.)[1]
Source: JOURNAL OF APPLIED POLYMER SCIENCE Volume: 118 Issue: 3 Pages: 1306-1312 DOI: 10.1002/app.32311 Published: NOV 5 2010
Times Cited: 1 (from Web of Science)
Cited References: 39 [view related records] **Citation Map**
Abstract: This article sheds light on some structural changes in thermally treated viscose fibers at a constant temperature of 100 +/- 1 degrees C at different time periods. The obtained optical parameters were used to calculate the crystallinity, density, Herman's orientation function, average orientation, and form birefringence. In addition, the stress optical coefficients, thermal stress, molar refractivity, specific refractivity, and polarizabilities along and across the axis and segment anisotropy were obtained. Measurements of the refractive indices helped us to calculate the dielectric constant, dielectric susceptibility, surface reflectivity, and transparency transmittances. The mechanisms of structural variation for the viscose fibers due to the annealing process were examined with the structural details for optothermal parameters. The relationships between the measured and calculated parameters are given in illustrations and curves. (C) 2010 Wiley Periodicals, Inc. J Appl Polym Sci 118: 1306-1312, 2010
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Author(s): Gaur, H.; De Vries, H.
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The Activation Energy and Some Structural Parameters of Thermally Treated Polypropylene Suture Fibers
Author(s): Fouda, IM (Fouda, I. M.)[1]; Seisa, EA (Seisa, E. A.)[1]
Source: INTERNATIONAL JOURNAL OF POLYMERIC MATERIALS Volume: 58 Issue: 4 Pages: 191-201 Article Number: PII 908833816 DOI: 10.1080/00914030802639940 Published: 2009
Times Cited: **0** (from Web of Science)
Cited References: **22** [view related records] **Citation Map**
Abstract: Multiple-beam Fizeau fringes in transmission were used to study the changes in optical parameters of thermally treated polypropylene PP suture fibers. Changes in the refractive indices and birefringence have been measured interferometrically on thermally treated PP suture fibers at temperatures of 19 to 400.5C. From the optical parameters; the mean polarizability of monomer units, the density, stress optical coefficient, the thermal stress and the activation energy of PP sutures were calculated. The results of density and optical measurements were used to calculate the crystallinity and the specific refractivity of the isotropic dielectric. Additionally, we calculated the mean square density fluctuation, the segment anisotropy, the molar refractivity and form birefringence. Relations between evaluated and measured parameters are given for illustration. The present study throws light on the changes due to slight thermal treatments as an example of thermal human end uses. Curves are given for illustration.
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Author Keywords: activation energy; crystallinity; form birefringence; interferometry; molar refractivity; orientation; polypropylene sutures
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Author(s): FISCHER, EW; FAKIROV, S
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DOI: 10.1007/BF02396639 Abstract Number: A1976-066325 Published: 1976

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Author(s): FOUDA, IM; ELTONSY, MM; SHABAN, AM
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Author(s): Fouda, IM; Kabeel, MA; El-Sharkawy, FM
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Author(s): HAMZA, AA; FOUDA, IM; ELTONSY, MM; et al.
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Author(s): RIANDE, E; GUZMAN, J; TARAZONA, MP; et al.
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18.Title: Influence of drawing and temperature on the optical and structural properties of monofilament PP sutures
Author(s): Seisa, EA Source: INTERNATIONAL POLYMER PROCESSING Volume: 21 Issue: 2 Pages: 183-188 Published: MAY 2006

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Author(s): ZACHARIODES AZ
Source: STRENGTH STIFFNESS P Pages: 121 Published: 1983

Interferometric study of creep deformation and some structural properties of polypropylene fiber at three different temperatures

Author(s): Fouda, IM (Fouda, I. M.)[1]; EL-Farahaty, KA (EL-Farahaty, K. A.)[1]; Seisa, EA (Seisa, E. A.)[1]

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DOI: 10.1002/app.28714 Published: OCT 15 2008

Abstract:
Influence of temperature on creep deformation for polypropylene PP fiber under a constant load was studied interferometrically. The automated multiple-beam Fizeau system in transition was equipped with a mechanical creep device attached to a wedge interferometer. This system was used to determine the optical properties (n(II), n(I) and Delta n) of PP fiber during the creep process at constant loading with varying temperature. The creep compliance was drawn as a function of both time and temperature. An empirical formulat was suggested to describe the creep compliance curves for PP fibers and the constants of this formula was determined. Two Kelvin elements combined in series were used to provide an accurate fit to the experimental compliance curves. The stress-strain curve via creep was studied to determine some mechanical parameter of PP fibers, Young's modulus E, yield stress sigma(gamma), and yield strain epsilon(gamma). The optical orientation function f(theta), the dielectric constant d, the dielectric susceptibility chi, the surface reflectivity ($) over barR, and the average work per chain W" were also calculated. (C) 2008 Wiley Periodicals, Inc. J Appl Polym Sci 110:761-768 2008

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KeyWords Plus: REFRACTIVE-INDEX PROFILE; OPTOTHERMAL PROPERTIES; PET FIBERS; ORIENTATION

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Author(s): WARD, IM
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Optomechanical properties of the morphology of viscose fibers due to the cold-drawing process

Author(s): Fouda, IM (Fouda, I. M.)[1]; Seisa, EA (Seisa, E. A.)[1]

Source: JOURNAL OF APPLIED POLYMER SCIENCE Volume: 110 Issue: 2 Pages: 872-879
DOI: 10.1002/app.28549 Published: OCT 15 2008

Abstract: This study sheds light on the changes produced by the effects of cold-drawn fibers on the microstructure and macrostructure of viscose fibers. The optical properties and strain produced in viscose fibers were measured interferometrically at room temperature. Structural parameters were calculated, Such as the work per unit of volume, the reduction in entropy due to elongation, and the harmonic mean specific refractivity. In addition, the resulting data were used to calculate the optical stress coefficient and optical configuration and to apply the Mooney-Rivlin equation to determine the constants. Also, the number of crystals per unit Of Volume and the average orientation angle for uniaxial stretching were calculated with the extension ratios. The relation between the true stress and strain hardening was calculated. The average value of the maximum birefringence was determined to equal 0.046. The relations between the optical and mechanical changes with different parameters were established for the studied fibers. Microinterferograms and curves were drawn for illustration. (c) 2008 Wiley Periodicals, Inc.

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Research Areas: Polymer Science
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Author(s): Fouda, IM; Shabana, HM
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Author(s): Fouda, IM; El-Tonsy, MM
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Author(s): RIANDE, E; GUZMAN, J; TARAZONA, MP; et al.
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Author(s): WARD, IM
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The effect of stretching on monofilament polypropylene sutures
Author(s): Fouda, IM (Fouda, I. M.)[1] ; Seisa, EA (Seisa, E. A.)[1]
Source: JOURNAL OF POLYMER RESEARCH Volume: 15 Issue: 4 Pages: 259-268 DOI: 10.1007/s10965-007-9166-y Published: AUG 2008
Abstract:
The effect of cold drawing on monofilament Polypropylene sutures PP at room temperature 24 degrees C were studied interferometrically. The changes in the molecular orientation were evaluated to obtain optical and mechanical orientation factors f(2)(theta), f(4)(theta), f(6)(theta), P(2)(cos theta), P(4)(cos theta), crystalline and amorphous orientation functions f(c) and f(a), respectively. The shrinkage factors, the reduced stress and the number of chains between cross links per unit volume were determined. Calculation of the cross link density (N(0)) and the chain entanglement density (N(c)) with the aid of Moony-Rivlin equation constants were given. Also, other various different opto-mechanical parameters were calculated. Relations between the optical and mechanical parameters were given. The present study demonstrates changes in the different orientation factors and structural parameters. Illustrations were given using curves and microinterferograms.
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ISSN: 1022-9760

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Author(s): ELTONSY, MM; SHABAN, AM; FOUDA, IM
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Author(s): Fouda, I. M.; Seisa, E. A.
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Author(s): Fouda, IM; El-Sharkawy, FM
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Author(s): Fouda, IM; Oraby, AH
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