The influence of mechanical cold drawing and drawing velocity on the molecular structure of isotactic polypropylene fiber

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Abstract:
The main goal of this work study is to study the influence of mechanical cold drawing and drawing velocity on the molecular orientation and physical structure parameters of isotactic polypropylene, iPP, fibers. A Video Opto- Mechanical device (VOM) attached with automatic multiple-beam interferometric technique was used to cold draw iPP fibers at different draw ratio and drawing velocity. The molecular structure of iPP fiber was characterized by measuring the refractive indices, birefringence, optical orientation function, orientation angle, the percentage of the volume fraction of amorphous and crystalline regions, density and the mean square density fluctuation. The obtained microinterferograms of multiple beam interference fringes were enhanced and the noises were removed by using Fourier transform method. The obtained contour lines were analyzed via a software program for fiber refractive index determination. The results show that the drawing velocity has a less effect than the draw ratio on the molecular structure of iPP fiber. The contour lines of microinterferograms are given for illustration. (C) 2012 Wiley Periodicals, Inc. J. Appl. Polym. Sci., 2013

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Author(s): Bogoeva-Gaceva, Gordana; Grozdanov, Anita
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Author(s): Hamza, AA; Sokkar, TZN; Mabrouk, MA; et al.
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Author(s): KUDRNA, M; MITTERPACHOVA, M
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On Young's modulus profile across anisotropic nonhomogeneous polymeric fibre using automatic transverse interferometric method

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Abstract:
This paper provides the Young's modulus profile across anisotropic nonhomogeneous polymeric fibre using an accurate transverse interferometric method. A mathematical model based on optical and tensile concepts is presented to calculate the mechanical parameter profiles of fibres. The proposed model with the aid of Mach-Zehnder interferometer combined with an automated drawing device are used to determine the Young's modulus profiles for three drawn polypropylene (PP) fibres (virgin, recycled and virgin recycled 50/50). The obtained microinterferograms are analyzed automatically using fringe processor programme to determine the phase distribution.

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Publisher: Fondazione ACIMIT, Milano (Italia)

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Author(s): CRAWFORD, SM; KOLSKY, H
Source: PROCEEDINGS OF THE PHYSICAL SOCIETY OF LONDON SECTION B Volume: 64 Issue: 374 Pages: 119-125 DOI: 10.1088/0370-1301/64/2/304 Abstract Number: A1951-03469 Published: 1951

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Author(s): El-Diasty, F
Source: JOURNAL OF THE OPTICAL SOCIETY OF AMERICA A-OPTICS IMAGE SCIENCE AND VISION Volume: 18 Issue: 5 Pages: 1171-1175 DOI: 10.1364/JOSAA.18.001171 Abstract Number: A2001-12-4281-010; B2001-06-4125-050 Published: MAY 2001

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Author(s): Zbigniew, KW.
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Interferometric determination of the birefringence of thermo-tropic polyester fibers and its copolymers of structure (PCPT-co-CPO)

Author(s): Hamza, AA (Hamza, A. A.)[1,2]; Sokkar, TZN (Sokkar, T. Z. N.)[2]; El-Bakary, MA (El-Bakary, M. A.)[2]

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Abstract:
The aim of this study is to determine the optical anisotropy of three different samples of thermo-tropic polyester fibers of structure Poly(chloro-1,4-phenylene terephthalate-co-4,4'-oxybisbenzoate) and its copolymers (PCPT-co-CPO). The molar fraction of disruptor units ([CPO]) ranging from 0.40 to 0.60. The variable wavelength interferometry, VAWI technique, was used to determine the birefringence and spectral dispersion properties of such of these fibers. The Cauchy's dispersion formula and its related constants were determined using the spectral dispersion curves of the birefringence. A mathematical formula was derived for direct measurement of the birefringence profile of highly birefringent polymer fibers using VAWI technique. The effect of varying copolymer molar fractions of the three samples of thermo-tropic polyester fibers was investigated throughout the spectral dispersion curves, the Cauchy's formula constants and the birefringence profiles. Microinterferograms are given for illustration. (c) 2012 Wiley Periodicals, Inc. J Appl Polym Sci, 2012

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KeyWords Plus: HIGHLY-ORIENTED FIBERS; SPECTRAL DISPERSION-CURVES; REFRACTIVE-INDEX PROFILE; LIQUID-CRYSTALLINE; OPTICAL-PROPERTIES; COPOLYESTERS; POLYMERS

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Author(s): El-Bakary, MA
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Author(s): El-Bakary, MA
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Author(s): Hamza, AA; Sokkar, TZN; El-Bakary, MA; et al.
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Author(s): JOHNSON, DJ; KARACAN, I; MAJ, PEP; et al.
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Author(s): PLUTA, M
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Author(s): Sato, M; Nakashima, S; Uemoto, Y
Source: JOURNAL OF POLYMER SCIENCE PART A-POLYMER CHEMISTRY Volume: 41 Issue: 17 Pages: 2676-2687 DOI: 10.1002/pola.10818 Published: SEP 1 2003

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Author(s): Sokkar, TZN; El-Farahary, KA; El-Bakary, MA

Source: JOURNAL OF APPLIED POLYMER SCIENCE Volume: 89 Issue: 7 Pages: 1737-1742 DOI: 10.1002/app.12189 Abstract Number: A2004-02-7820D-001 Published: AUG 15 2003

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Author(s): Sokkar, TZN; El-Bakary, MA
Source: JOURNAL OF PHYSICS D-APPLIED PHYSICS Volume: 34 Issue: 3 Pages: 373-378 DOI: 10.1088/0022-3727/34/3/321 Abstract Number: A2001-07-4281-003 Published: FEB 7 2001

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Author(s): Vlad-Bubulac, Tachita; Hamciuc, Corneliu
Source: POLYMER ENGINEERING AND SCIENCE Volume: 50 Issue: 5 Pages: 1028-1035 DOI: 10.1002/pen.21616 Published: MAY 2010

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Publisher: Institute of Applied Optics, Warsaw, Poland

Multi-mode opto-thermo-mechanical stretching system for determination of 3D refractive index along the axis of stretched and/or heated fibres

Author(s): Sokkar, TZN (Sokkar, T. Z. N.)[1]; El-Tonsy, MM (El-Tonsy, M. M.)[1]; El-Morsy, MA (El-Morsy, M. A.)[2]; El-Khateep, SM (El-Khateep, S. M.)[1]; Raslan, MI (Raslan, M. I.)[1]

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DOI: 10.1016/j.optlastec.2010.12.015 Published: OCT 2011

Abstract:
A multi-mode opto-thermo-mechanical stretching system was modified to study the changes in the 3D of optical and structural properties of stretched fibre along its axis. The structural deformation of isotactic Polypropylene, (iPP), fibres was studied at different draw ratios. The modified system coupled with Pluta polarising interference microscope was used to determine the variation of the birefringence in three dimensions during stretching process. Using this modified system, the multi-necking was detected. Subfringe analysis technique was used to determine the phase distribution of the obtained microinterferograms, which were given for illustration. (C) 2011 Elsevier Ltd. All rights reserved.

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Reconstruction of refractive indices distribution in 3D using a single pattern of multiple-beam interference fringes for online investigation of necking phenomenon

Author(s): Hamza, AA (Hamza, A. A.)[1,2]; Sokkar, TZN (Sokkar, T. Z. N.)[1]; El-Farahaty, KA (El-Farahaty, K. A.)[1]; Raslan, MI (Raslan, M. I.)[1]

Source: POLYMER TESTING Volume: 29 Issue: 8 Pages: 1031-1040 DOI: 10.1016/j.polymertesting.2010.09.006 Published: DEC 2010

Abstract:

A proposed model for reconstructing the refractive indices distribution in three dimensions is introduced. The reconstruction process requires a single multiple-beam interference pattern which facilitates online investigation of structural changes. In order to increase the accuracy of the measured refractive indices, fringe analysis was applied on the basis of the inverse interferogram principle proposed in this article. Verification of the modified technique was made using reconstructed noise-free interference patterns. The modified technique is helpful in studying the necking phenomenon observed during creep extension of polypropylene fibres. Refractive index distribution in 3D across the fibre was determined and the birefringence profile was calculated. Microinterferograms are given for illustration. (C) 2010 Elsevier Ltd. All rights reserved.

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