



Optica Applicata 2004(Vol.34), No.2, pp. 163-183

## Opto structural effects of annealing of Nylon 66 fibers

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Keywords

orientation, crystallinity, annealing, Nylon 66, skin-core, interferometry

Abstract

Multiple-beam Fizeau fringes are used to study the changes in optical parameters of annealed Nylon 66 fibers. Changes in the refractive indices and birefringence of skin and core have been measured interferometrically. The application was carried out using multiple-beam Fizeau fringes in transmission to determine the principal optical parameters characterizing the skin-core layers. The density of the fibers was measured by a system based on the theory of vibrating strings. The results of density and optical measurement were used to calculate the degree of crystallinity, the form birefringence, the number of monomeric units per unit volume, the harmonic mean polarizability of the dielectric, the harmonic mean specific refractivity and the virtual refractive index. The results also were used to obtain the stress-optical coefficient  $C_s$ , the optical configuration parameter  $\Delta a$ , the mean square density fluctuation  $\langle \eta_2 \rangle$ , the segment anisotropy  $\gamma_s$ , molar refractivity  $R$  and the thermal stress  $\sigma$  in different annealing conditions. The results clarify the reorientation, and layer changes occurring due to annealing conditions. The optical orientation function and the angle of orientation are also calculated. Relations between the optical parameters with different thermal effects are discussed.



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