Title (en)

FIELD-ASSISTED FIBER SPINNING FOR THE PREPARATION OF OPTICAL FIBERS HAVING NON-LINEAR OPTICAL ACTIVITY

Publication

EP 0377681 A4 19910731 (EN)

Application

EP 89900693 A 19880909

Priority

- US 9853387 A 19870918
- US 23791988 A 19880831

Abstract (en)

[origin: WO8903054A1] A method for the preparation of polymer-based optical fibers with nonlinear optical activity using a field-assisted fiber spinning technique has been developed. Example nonlinear optical activity includes electrooptic effects and second harmonic generation. A homogeneous mixture of a high-glass-transition-temperature polymer and a rigid-rodlike noncentrosymmetric molecule with nonlinear optical activity is employed in a specialized fiber-spinning operation. Equivalently, the noncentrosymmetric moieties can be chemically attached to the polymer backbone. A special spinneret is designed in such a manner as to allow a strong electric or magnetic field to be externally applied in the die (extrudate) swell region prior to fiber draw-down. In the die swell region, the imposed electric or magnetic field imparts a preferential orientation to the rod-like molecules (segments), where the molecular dipoles acquire an anisotropic spatial orientational distribution. This preferential alignment is subsequently accentuated and trapped in fiber draw-down, where the mixture cools and vitrifies. Elongational deformation experienced by the mixture in the draw-down region hydrodynamically forces the rod-like molecules (segments) to align with the fiber axis. Hence, the final product is nonlinearly-active polymer optical fibres doped with noncentrosymmetric rod-like molecules (segments) whose molecular axis is aligned with the fiber axis. In addition, the alignment is such that the net dipole moment of the system as a whole is non-zero due to the strong electromagnetic field imposed prior to fiber draw-down. This invention is useful in a wide variety of electrooptic and optoelectronic applications.

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Citation (search report)

- [X] EP 0232138 A2 19870812 - BRITISH PETROLEUM CO PLC [GB]
- [XP] WO 8802131 A1 19880324 - NORDISKE KABEL TRAAD [DK]
- [A] ELECTRONICS LETTERS, vol. 23, no. 8, 9th April 1987, pages 405-406; B.J. AINSLIE et al.: "Semiconductor-doped fibre waveguides exhibiting picosecond optical nonlinearity"
- See references of WO 8903054A1

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