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CHARACTERSTIC ANALYSIS OF POLY STYRENE POLYMER IN OPTICAL FIBER

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Abstract

Optical fiber (or "fiber optic") refers to the medium and this technology related to the transmission of knowledge as lightweight pulses on a glass or plastic strand or fiber. Fibre carries way more info than standard copper wire and is normally not subject to magnetic attraction interference and therefore the have to be compelled to channel signals..Most phone corporation long-distance lines are actually made of optical fiber. Transmission over an optical fiber link requires repeaters. The glass fiber requires more assurance inside an external link than copper. Thus the establishment of any new cabling is work concentrated, couple of groups have introduced optical fiber links from the telephone organization's branch office to neighbourhood clients (known as nearby circles). Our project aim is to provide an efficient transmission of data by analysed usage of different material in manufacture the fiber. By utilizing the material which has a optical property to give an effective transmission of information.

I. Introduction

Optical fiber is a material through which expertise can also be efficiently transferred within the type of light. Depending on the fabric with which the core and cladding are made, efficiency of data transmitted is set. Accordingly finding out the traits to verify the first-rate materials for the optical fiber is big. To consider about the portrayal of unique material and to create the fiber making use of that material this has a promising optical property with a purpose to supply a productive transmission of information. To suppose concerning the portrayal of exclusive fabric and to create the fiber using that material this has a promising optical property to be able to supply a productive transmission of information. Optical fiber alludes to the medium and the innovation connected with the transmission of knowledge as light heartbeats alongside a pitcher or plastic strand or fiber. Optical fiber conveys significantly extra knowledge than ordinary copper wire and is most likely no longer discipline to electromagnetic impedance and the

have got to retransmit alerts. Most phone group long-separate traces are at this time product of optical fiber. Transmission over an optical fiber hyperlink requires repeaters at separation interims. The glass fiber requires more insurance inside of an outside link than copper. As a result and because the establishment of any new cabling is work escalated, couple of businesses have introduced optical fiber hyperlinks from the mobile phone institution's branch workplace to regional purchasers. A sort of fiber often called single mode fiber is utilized for more separations; multimode fiber is utilized for shorter separations.

2. Literature survey

2.1 Behaviour of Pvc Formed on Carbon-Fiber:

This paper indicates the experimentation of N-vinyl carbazole (NVCz) random polymers electrochemically coated onto micron-dimension carbon fibers in lithiumper chlorate/acetonitrile LiClO ACN, atomic quantity eleven per chlorate/acetonitrile NaClO ACN, and tetraethylammonium in an effort to create dopamine-sensing layers on the carbon fiber microelectrodes (CFMEs).The following micron-thick chemical compound films were characterised by using victimization scanning microscopy and Fourier transform infrared coefficient spectrometry. Electrocoating of chemical compound film was performed by 3 totally different chemistry approaches such as cyclic voltammeter and chrono ampere metric and chronopotentiometric polarizations.

These modified CFMEs were proven in opposition to Dopastatbyapplying exclusively cyclovoltammetrictechniques. Below optimum experimental stipulations, the conductor suggests a reversible and steady behaviour during twenty 4 days during a nil.1-M TEABF ACN resolution and, hence, might be although about as promising detector for Dopastatdetection. The Intrepid detection restrict as low as zero.01 no (3S/N) was acquired for the substance film fashioned amongst utilized cyclic voltammeter, chronoamperometry, and chronopotentiometry. Index terms—Carbon fiber microelectrode (CFME), conducting substance movies, cyclic voltammetry (CV), dopamine, poly [N-vinyl carbazole] (NVCz).

2.2. Single-Mode Transmission in Tapered Multimode As2Se3-PMMA Fibers:

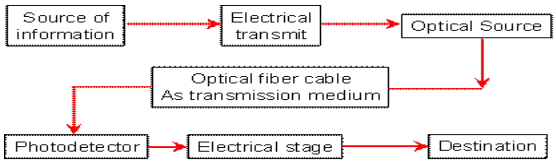
This paper show's the fabrication and use of a 10-cm-lengthy As2Se3-PMMA microwire with ultrahigh waveguide nonlinearity ¼ 176 W1m1 that's fully compatiblewith commonplace single-mode silica fibers. The fabrication of this microtaper is simplified withrespect to a earlier strategy as the core is manufactured from a bulk As2Se3 cylinder rather than asingle-mode step-index As2Se3 fiber. The effective operation of this nonlinear componentis demonstrated with a Kerr-shutter switching experiment based on nonlinear polarizationrotation.

2.3 Two-Photon-Excited Emission in Polymer Optical Fibers:

In this paper they discussed about two-photon-excited emission spectra of polymer optical fibers doped with the conjugated polymer Poly(9,9-dioctylfluorene-alt-benzothiadiazole) (F8BT) were measured pumping the fibers transversely to their symmetry axis.Measurements incorporate evolutions of the emission spectra with excitation wavelength and with propagation distance, at the side of an analysis of emission photostability. Comparisons with outcome for one-photon-excited emission are also awarded.

3. Project Overview

Optical fiber is a fabric via which information can also be effectually transferred in the form of mild. The refractive index of core should be larger than cladding as a way to acquire low loss and excessive obtain optical fiber. An optical fiber whose core is made from Polystyrene i.e. PS with silicon composite and cladding is made of (benzene, vinyl chloride, poly tetrafluoroethylene, ethyl chloride), anyone of those fabric depending upon its optical traits that satisfies the optical fiber design parameter. From the characterisation, the core will also be composed of composite of PMMA i.e.Poly(methyl methacrylate) and silicon and the cladding section is composed of PMMA. The scope of the mission is to design an optical fiber which satisfy its residences and to transmit data by means of it with bigger efficiency and low loss.



Block Diagram of Optical Fiber Communication.

4. Principle Of Optical Fiber:

For understanding (reminiscent of voice) into electrical indicators to begin with ,then ship to laser modulation of the laser beam, the light sign with the amplitude (frequency) trade, and ship out through the optical fiber; at the acquire end,after receiving light signal, the detector transforms it into electrical alerts, get well to common knowledge after demodulation.

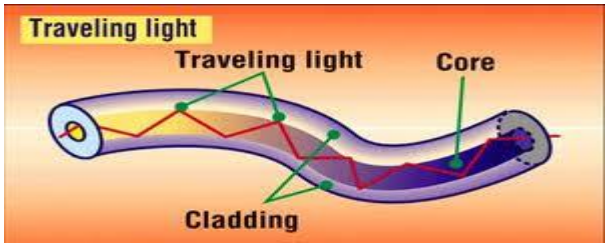


Fig 4.1 structure of optical fiber.

An optical fiber is a cylindrical dielectric waveguide (non conducting waveguide) that transmits mild alongside its axis, by way of the system of whole internal reflection. The fiber contains a core surrounded by using a cladding layer, both of which are product of dielectric materials.To confine the optical sign inside the core, the index of refraction of the core must be higher than that of thefacing.The boundary between the core and cladding could both be abrupt, in step-index fiber, or gradual, in graded-index fiber.

5. Methodology

5.1 Sol-Gel Method:

Sol-gel is an bendy route for the synthesis of inorganic, healthy-inorganic networks equivalent to glasses, ceramics, movies or powders. For a long time, sol-gel methods have been used for manufacturing glasses and ceramics. More latest reviews of this system have fascinated about electrical applications, medical science, safety coatings , and sun energy functions .Depending on the varieties of interactions that arise between the parts, better properties than either of the accessories could emerge.Growing these substances will also be as effortless as mixing them collectively in asol-gel system to provide a homogeneous hybrid.

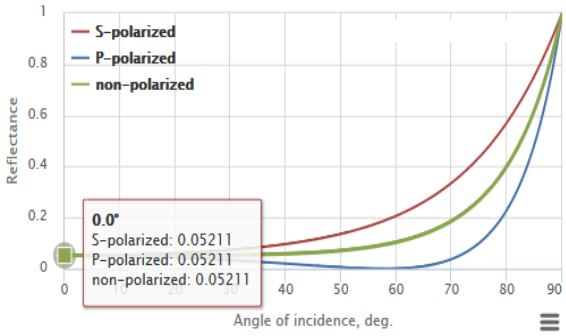
5.2 Steps Involved In Sol-Gel Method:

PMMA have been first dissolved in at chloroform a awareness of 10 wt%. SIO2 resolution(SIO2+ HCl(zero.15M)) was introduced drop by way of drop to the solution beneath steady stirring to offer three exclusive natural and organic/inorganic ratios (20/eighty, 50/50 and 80/20, v/v). Provide water and to catalyse the sol-gel response. The H2O: TEOS molar ratio used to be 4:1.The answer was stirred for 1 h at room temperature and later transferred to closed glass Petri dishes.

6.1. Output Scenario of Input and Output Direction

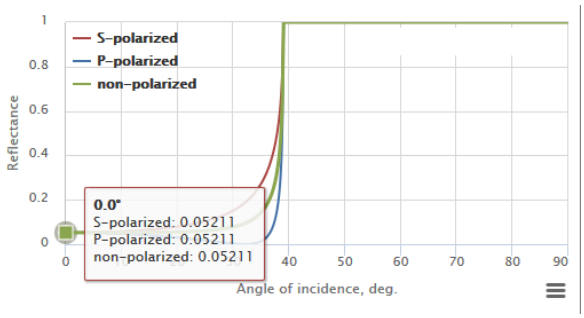
6.1.1 Tabulation for Angle Of 10 Degree

Input direction result:



MATERIAL	PS
DIRECTION	INPUT
ANGLE OF DEGREE	10
REFRACTIVE INDEX	n = 1.5916
WAVE LENGTH (0.4047 – 1.083)µm	0.5876
ABBE NUMBER	Vd = 29.53
CHROMATIC DISPERSION	dn/dλ = -0.10196 µm-1
GROUP INDEX	ng = 1.6515
GROUPVELOCITY DISPERSION	GVD = 200.18 fs2/mm
REFLECTANCE(µm)	0.5876 µm
S-POLARIZED	Rs=0.054148
P-POLARIZED	Rp=0.050114
NON-POLARIZED,(Rs+Rp)/2	R=0.052131
REFLECTION PHASE(ϕs)	ϕS = 180°
REFLECTION PHASE(ϕp)	ϕP = 180°
BREWSTER'S ANGLE(θB)	θB = 57.859°
DISPERSION FORMULA	$n^2 - 1 = \frac{1.4435\lambda^2}{\lambda^2 - 0.020216}$

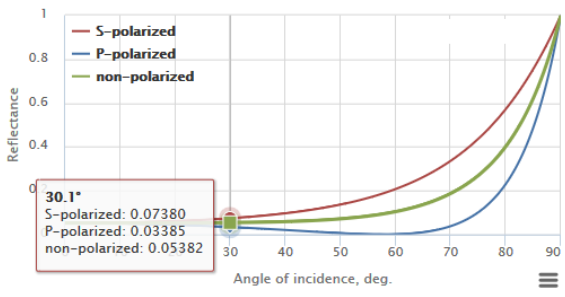
Output direction result:



MATERIAL	PS

DIRECTION	OUTPUT
ANGLE OF DEGREE	10
REFRACTIVE INDEX	n = 1.5916
WAVE LENGTH (0.4047 – 1.083)µm	0.5876
ABBE NUMBER	Vd = 29.53
CHROMATIC DISPERSION	dn/dλ = -0.10196 µm-1
GROUP INDEX	ng = 1.6515
GROUPVELOCITY DISPERSION	GVD = 200.18 fs2/mm
REFLECTANCE(µm)	0.5876 µm
S-POLARIZED	Rs=0.057516
P-POLARIZED	Rp=0.046949
NON-POLARIZED,(Rs+Rp)/2	R=0.052233
REFLECTION PHASE(ϕs)	ϕS = 0°
REFLECTION PHASE(ϕp)	ϕP = 0°
BREWSTER'S ANGLE(θB)	θB = 32.141°
DISPERSION FORMULA	$n^2 - 1 = \frac{1.4435\lambda^2}{\lambda^2 - 0.020216}$

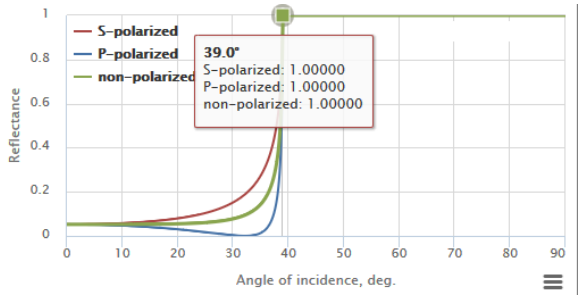
6.1.2 Tabulation for Angle of 30 Degree Input Direction Result:



MATERIAL	PS
DIRECTION	INPUT
ANGLE OF DEGREE	30

REFRACTIVE INDEX	n = 1.5916
WAVE LENGTH (0.4047 – 1.083)µm	0.5876
ABBE NUMBER	Vd = 29.53
CHROMATIC DISPERSION	dn/dλ = -0.10196 µm-1
GROUP INDEX	ng = 1.6515
GROUPVELOCITY DISPERSION	GVD = 200.18 fs2/mm
REFLECTANCE(µm)	0.5876 µm
S-POLARIZED	Rs=0.073632
P-POLARIZED	Rp=0.033968
NON-POLARIZED,(Rs+Rp)/2	R=0.053800
REFLECTION PHASE(ϕs)	ϕS = 180°
REFLECTION PHASE(ϕp)	ϕP = 180°
BREWSTER'S ANGLE(θB)	θB = 57.859°
DISPERSION FORMULA	$n^2 - 1 = \frac{1.4435\lambda^2}{\lambda^2 - 0.020216}$

Output Direction Result:

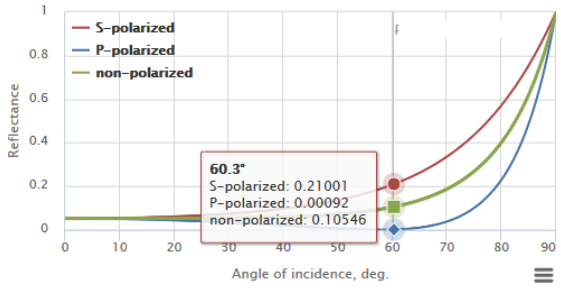


MATERIAL	PS
DIRECTION	OUTPUT
ANGLE OF DEGREE	30
REFRACTIVE INDEX	n = 1.5916
WAVE LENGTH	0.5876

(0.4047 – 1.083)µm	
ABBE NUMBER	Vd = 29.53
CHROMATIC DISPERSION	dn/dλ = -0.10196 µm-1
GROUP INDEX	ng = 1.6515
GROUPVELOCITY DISPERSION	GVD = 200.18 fs2/mm
REFLECTANCE(µm)	0.5876 µm
S-POLARIZED	Rs=0.15175
P-POLARIZED	Rp=0.0028550
NON-POLARIZED,(Rs+Rp)/2	R=0.077303
REFLECTION PHASE(ϕs)	ϕS = 0°
REFLECTION PHASE(ϕp)	ϕP = 0°
BREWSTER'S ANGLE(θB)	θB = 32.141°
DISPERSION FORMULA	$n^2 - 1 = \frac{1.4435\lambda^2}{\lambda^2 - 0.020216}$

6.1.3 Tabulation for Angle of 50 Degree

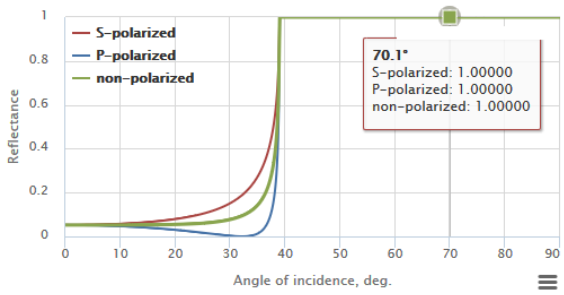
Input Direction Result



MATERIAL	PS
DIRECTION	INPUT
ANGLE OF DEGREE	50
REFRACTIVE INDEX	n = 1.5916
WAVE LENGTH (0.4047 – 1.083)µm	0.5876

ABBE NUMBER	Vd = 29.53
CHROMATIC DISPERSION	dn/dλ = -0.10196 µm-1
GROUP INDEX	ng = 1.6515
GROUPVELOCITY DISPERSION	GVD = 200.18 fs2/mm
REFLECTANCE(µm)	0.5876 µm
S-POLARIZED	Rs=0.13629
P-POLARIZED	Rp=0.0059491
NON-POLARIZED,(Rs+Rp)/2	R=0.071121
REFLECTION PHASE(ϕs)	ϕS = 180°
REFLECTION PHASE(ϕp)	ϕP = 180°
BREWSTER'S ANGLE(θB)	θB = 57.859°
DISPERSION FORMULA	$n^2 - 1 = \frac{1.4435\lambda^2}{\lambda^2 - 0.020216}$

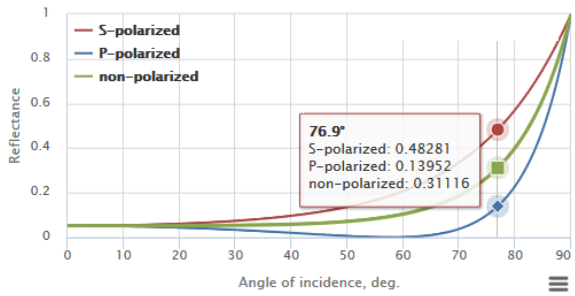
Output Direction Result:



MATERIAL	PS
DIRECTION	OUTPUT
ANGLE OF DEGREE	50
REFRACTIVE INDEX	n = 1.5916
WAVE LENGTH (0.4047 – 1.083)µm	0.5876
ABBE NUMBER	Vd = 29.53
CHROMATIC	dn/dλ = -0.10196 µm-1

DISPERSION	
GROUP INDEX	ng = 1.6515
GROUPVELOCITY DISPERSION	GVD = 200.18 fs2/mm
REFLECTANCE(µm)	0.5876 µm
S-POLARIZED	Rs=1.0000
P-POLARIZED	Rp=1.0000
NON-POLARIZED,(Rs+Rp)/2	R=1.0000
REFLECTION PHASE(ϕs)	ϕS = -68.574°
REFLECTION PHASE(ϕp)	ϕP = 60.138°
BREWSTER'S ANGLE(θB)	θB = 32.141°
DISPERSION FORMULA	$n^2 - 1 = \frac{1.4435\lambda^2}{\lambda^2 - 0.020216}$

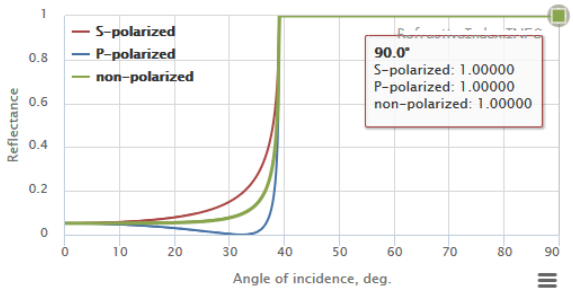
6.1.4 Tabulation for Angle of 70 Degree Input Direction Result:



MATERIAL	PS
DIRECTION	INPUT
ANGLE OF DEGREE	70
REFRACTIVE INDEX	n = 1.5916
WAVE LENGTH (0.4047 – 1.083)µm	0.5876
ABBE NUMBER	Vd = 29.53
CHROMATIC DISPERSION	dn/dλ = -0.10196 µm-1

GROUP INDEX	ng = 1.6515
GROUPVELOCITY DISPERSION	GVD = 200.18 fs2/mm
REFLECTANCE(µm)	0.5876 µm
S-POLARIZED	Rs=0.33579
P-POLARIZED	Rp=0.037796
NON-POLARIZED,(Rs+Rp)/2	R=0.18679
REFLECTION PHASE(ϕs)	ϕS = 180°
REFLECTION PHASE(ϕp)	ϕP = 180°
BREWSTER'S ANGLE(θB)	θB = 57.859°
DISPERSION FORMULA	$n^2 - 1 = \frac{1.4435\lambda^2}{\lambda^2 - 0.020216}$

Out Direction Result:



MATERIAL	PS
DIRECTION	OUTPUT
ANGLE OF DEGREE	70
REFRACTIVE INDEX	n = 1.5916
WAVE LENGTH (0.4047 – 1.083)µm	0.5876
ABBE NUMBER	Vd = 29.53
CHROMATIC DISPERSION	dn/dλ = -0.10196 µm-1
GROUP INDEX	ng = 1.6515
GROUPVELOCITY	GVD = 200.18 fs2/mm

DISPERSION	
REFLECTANCE(μm)	0.5876 μm
S-POLARIZED	Rs=1.0000
P-POLARIZED	Rp=1.0000
NON-POLARIZED,(Rs+Rp)/2	R=1.0000
REFLECTION PHASE(ϕs)	ϕS = -127.840°
REFLECTION PHASE(ϕp)	ϕP = 21.871°
BREWSTER'S ANGLE(θB)	θ_B = 32.141°
DISPERSION FORMULA	$n^2 - 1 = \frac{1.4435\lambda^2}{\lambda^2 - 0.020216}$

7. Conclusion

Therefore we analysed the different parameters of polystyrene by means of altering the attitude of incidence of the input direction. At 70 degree incidence angle We discovered that the reflection gets larger than different angles(10,30,50). Considering, this angle provides better outcome for transmission of information. We implement this angle as the enter course for the powerful data transmission.

8. References

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