International Journal of ChemTech Research
CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555
Vol.10 No.7, pp 640-644, 2017

Preparation and Characterization of (PVA-$FeCI_3$) Composites

Jaafar T.Ahmed[2], Hassan A.Majeed[1]*, Nagham M. Obaid[1], Saddam Flayeh Haddaiw[1]

[1]University of Babylon, Collage of Science for Girls, Department of Laser Physics, IRAQ
[2]Ministry of education, IRAQ

Abstract : In the present work ,the impact of FeCl3 expansion on some optical properties of poly-vinyl alcohol has been contemplated . for this reason , many specimens has been set up by adding FeCl3 to the poly-vinyl alcohol with efferent weight rates from FeCl3 with polymer and by various thickness . The ingestion and transmission spectra has been recorded in the wavelength range (190-890)nm. The ingestion coefficient, refractive file, termination coefficient , genuine and fanciful dielectric steady and finesses coefficient have been resolved.

Introduction

The organic semi conducting materials are grouped as polymer , monomer and organic compounds . they are a class of materials which are interesting due to their unusual properties. These materials are light weight, flexible, easily processed and inexpensive. Their present restoration of enthusiasm for electronic properties is reflected by an impressive increment in the quantity of examinations managing the estimations of optical and electrical properties. They are of great interest in electronic devices and multiple advantages due to the variety of their structures[1]. In the last couple of decades, many research bunches have seriously explored natural polymers and their applications in different fields. Counting natural field impact transistors (OFET), natural light-transmitting gadgets (OLED), sun powered cells, nonlinear optic gadgets, batteries and diodes because of their predominant concoction physical and electronic properties, engineered accessibility auxiliary adaptability and great ecological stability[2,3] In the recent years conjugated conducting polymers have been the main focus of research throughout the world. Since the discovery led by 2000 chemistry Nobel winners, Shirakawa, MacDiarmid and Heeger , the perception that plastic could not conduct electricity has changed Nowadays, conducting polymers also known as conductive plastics are being produced for some uses, for example, erosion inhibitors, conservative capacitors, antistatic covering, electromagnetic protecting and brilliant windows; which skilled to change the measure of light to pass[4,5].

This paper manages consequences of the impact of FeCl3 on the some optical properties of poly-vinyl alcohol.

Experiential part

The materials utilized as a part of this paper is poly-vinyl alcohol as network and FeCl3 as a filler. The electronic adjusted of exactness 10-4 have been utilized to acquire a weight measure of FeCl3powder and polymer powder. The weight rates for FeCl3 are (0,3,6 and 9) wt % . The transmittance & absorbance spectra

of (PVA- $FeCl_3$)composite have been recorded in the wavelength from(190) to (890) nm using beam spectrophotometer (UV-210^0 A shimedza).

Result and Discussion

The optical absorbance as function of the wavelength of the incident light of PVA- $FeCl_3$ composites of different filler substance is appeared in figure (1).The figure demonstrates that the intensity of the peak increased as a result of filler addition but no shift in the peak position, i.e. adding diverse amounts of filler to pure polymer don't change the substance structure of the material.

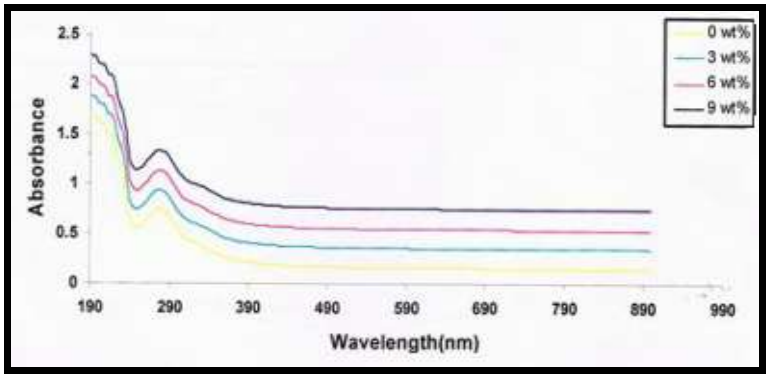
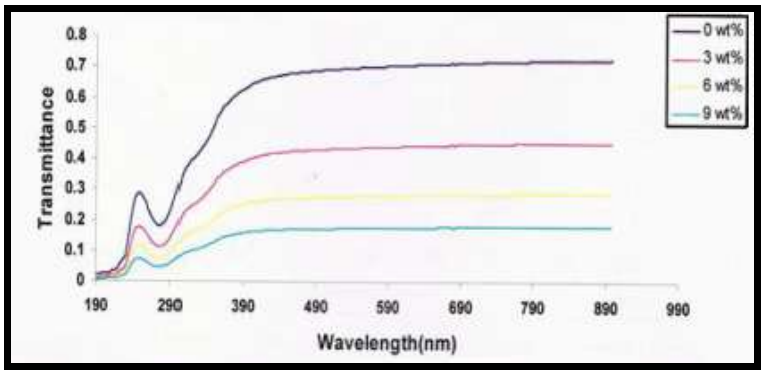


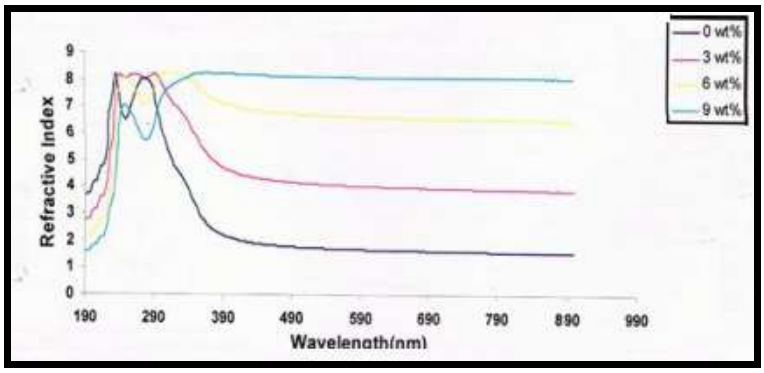
Figure (1): spectra of absorbance for (PVA- $FeCl_3$) composites as function of incident wavelength.

Figure (2) shows the behavior of optical transmittance of (PVA- $FeCl_3$) composites with wavelength .The figure demonstrates that the transmittance decreases with increase the weight percentage for $FeCl_3$.



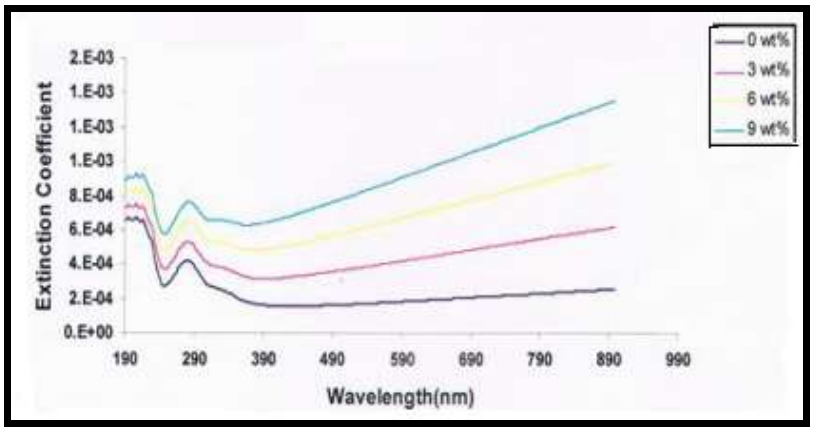
Figure(2): transmittance spectrum for (PVA- $FeCl_3$) composites as function of incident wavelength.

The relationship between refractive index of composites and photon energy of different weight percentages of $FeCl_3$ is shown in figure (3).



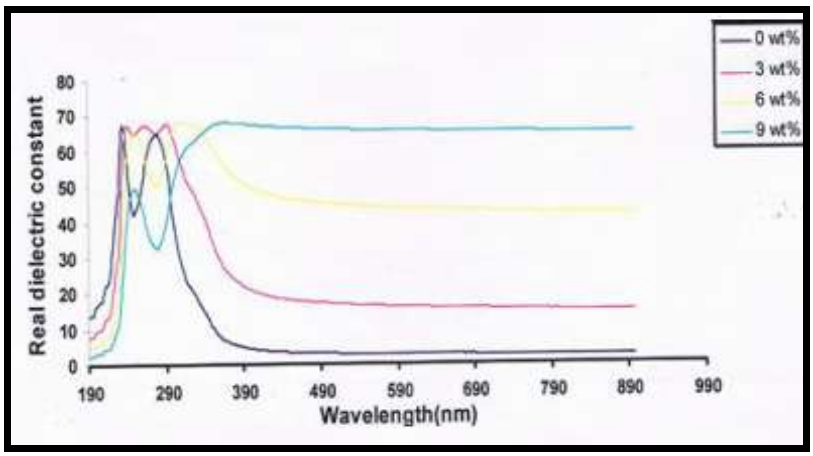
Figure(3):The variance of refractive index for PVA-FeCL3 composites with wavelengths.

Figure (4) display the relationship between extinctions coefficient and wavelength from this figure we note that the extinctions coefficient is increasing with increment ofFeCl.

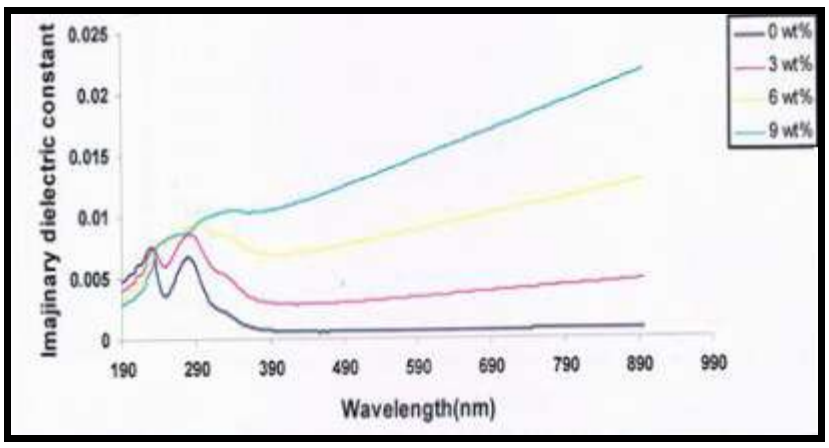


Figure(4): The variance of the extinctions coefficient (K) with wavelength of PVA-FeCL3 composites.

The real and imaginary dielectric constants (ε_1,ε_2) for (PVA- $FeCl_3$) composites have been calculated by equations ($\epsilon_1=n_2-k_2$) and ($\epsilon_2=2nk$) [2]. thefigure (5) and (6) shows the change of ε_1 and ε_2 as a function of the wavelength, the real and imaginary dielectric constant of composites increased with increase the $FeCl_3$ concentration this attribute to increase the refractive index of composites with increase the weights percentages of $FeCl_3$. where seen that $\varepsilon_1$is considerably depend on n^2because low value of k^2 , while ε_2 is depend on k values that change with the change of the absorption coefficient because the relation between n and k .



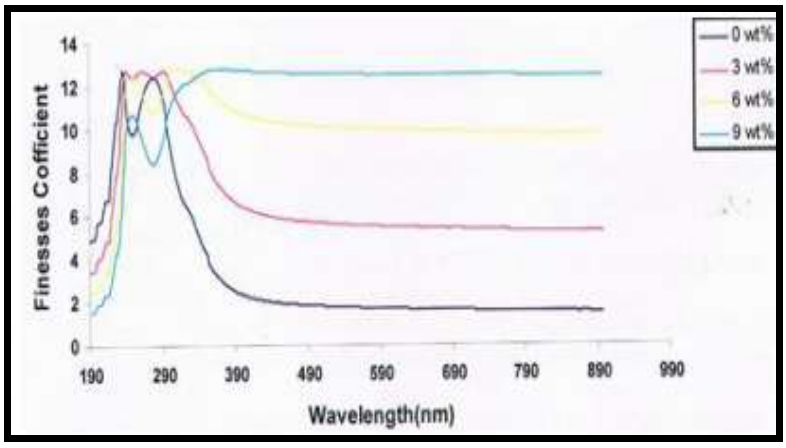
Figure(5): The variance of real dielectric constant for PVA-FeCL3 composites with wavelength.



Figure(6): The variance of imaginary dielectricof PVA-FeCL3 composites with wavelength.

The behavior of coefficient of finesses [F=4R/(1-R)] where R is reflectance, with wavelength of different $FeCl_3$ concentrations is shows in figure (7).

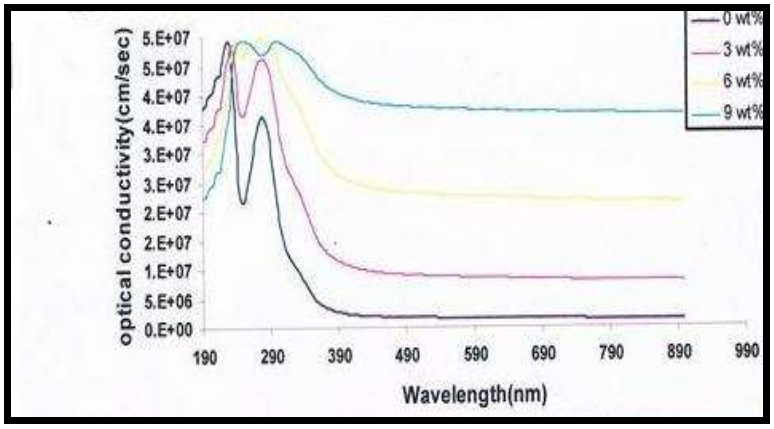
The figure show that the coefficient for finesses increase with increase $FeCl_3$ concentrations. This behavior attribute to increase refractive index with increase the $FeCl_3$ concentration.



Figure(7) :The variation of finesses coefficient for PVA-FeCL3 composites with wavelength .

Figure(8) show the variation of optical conductivity with incident photon energy.

The optical conductivity is determined by the relation ($\sigma = \alpha\ nc/4\pi$) where (c)is the speed of light, the depends optical conductivity directly on the absorption coefficient and where found to increase sharply for higher energy values because the large absorption coefficient for these values.



Figure(8): the variation of optical conductivity for PVA-FeCL3 composites with wavelength.

Conclusions

1. The absorbance of (PVA- $FeCl_3$) composites increase with increase of weight percentage of $FeCl_3$.
2. The refractive index ,real and imaginary dielectric constant ,coefficient of finesses and optical conductivity for (PVA- $FeCl_3$) composites are increasing with increase concentration of $FeCl_3$.
3. The transmittance of (PVA- $FeCl_3$) composites decrease with increase of weight percentage of $FeCl_3$.

References

1. M.Hashim.,(2009), " Band Edge , Dispersion parameters and optical of polyfurfury alcohol" , Dpt of physics , Faculty of science, Basrah Uni.
2. A.H Ahmed, Awatif A.M. &Zeid.A.M (2007), "Dopping Effect on Optical constants of (PMMA)" Eng. &Technology, Vol. 25,No.4.

3. M..Muhsen, A.Hashim.K.Mahdy,(2010), " Doping effect on constants of poly vinyl alcohol" , proceedings of the first scientific conference of physics , Alkuffa university , Iraq.
4. A M. H Harun.,(2009), " Temperature dependence of AC electrical conductivity of PVA-PPY-FeCI3 composite polymer flims" , Malaysia , Malaysian polymer Jounal (MPJ), Vol. 3, No.2 , p(24-31).
5. Z.Al-Ramadhan., (3008),"Effect of Nickel salt on electrical properties of polymethylmethacrylate" , J. of education , Al-Mustansiriyah Uni..N0.3.

*****