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GREEN SYNTHESIS AND CHARACTERIZATION OF THE PREPARED *ALOE VERA* PLANT EXTRACT THIN FILM IN A SIMPLE CHEMICAL METHOD

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Abstract

Natural materials are currently utilized in a wide scope of accuracy electronic applications in parallel with inorganic materials, because of their unrivaled properties, ecological wellbeing and ease. This paper depicts the portrayal of the meager *Aloe vera* (AV) film, which is another natural froth. Surface morphology, spatial dissemination of components and auxiliary qualities of the AVG layer were inspected utilizing checking electron microscopy, vitality scattered X-beam spectroscopy (EDX) and X-beam diffraction (XRD), individually. The EDX demonstrated that the components in the layer are C, O_2, Al, Si, Ca, K and Cu.

Key words: Aloe vera; optical, energy SEM; transmittance; XRD.

Introduction

Through the improvement and utilization of nanotechnology in the previous decade, metallic and non-metallic nanoparticles have increased more consideration because of their various properties contrasted with their properties in mass structure. In any case, these special qualities of National Specialists (NPs) are profoundly subject to the creation, size and size conveyance of shaped national bodies (Chen H., 2011). Among the different NPs, Se NPs increased a great deal of consideration because of its natural, substance, medicinal and pharmaceutical properties (Prasad K.S., 2013). A few examinations have shown that Se NPs are profoundly controllable in the thyroid hormone digestion, the body's resistance framework and numerous malignant growth metastases (Benstoem C., 2015 and Zhou Y., 2016). In reality, selenium assumes a significant job in the biosynthesis of significant cellulose compounds, including glutathione peroxidase and theoxidinosides, which are important for human wellbeing and different warm blooded creatures (Falandysz J., 2008 and Fayet-Moore F., 2014). Several concoction, physical and green get together techniques have been created and utilized in the assembling of numerous NPs. In any case, green union strategies are one-advance, a prudent and earth well disposed strategy because of the utilization of regular anti-infection agents and stabilizers in the development of NPs (Chen W., 2016). Plant separates and their subsidiaries have been broadly utilized in the assembling of NPs contrasted with microorganisms, which might be identified with disposal of cell culture and confinement (Prasad K.S., 2013).

As a significant therapeutic plant, *Aloe vera* contains strip (leaf) and gel and numerous investigations have uncovered that its leaves contain numerous nutrients, sugars, proteins, phenolic mixes, lenin, saponins, sterols, flavonoids, catalysts and natural acids that have a significant job in diminishing particles of their segments and the development of NPs Their own, introduced NPs blended (Sánchez-Machado D.I., 2014). In the blend of NPs, the principle objective is to frame NPs with least molecule size and most extreme strength (McClements J., 2016). A few parameters are impacted by pseudo-workforce properties, including pH, temperature, type and centralization of leaf concentrate, type and convergences of particles forerunners and other working parameters that are profoundly subject to the techniques utilized

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Table 1: XRD results for Aloe Vera thin film.

2 Theta (deg)	B (deg)	G_S (nm)	Dislocations density × 10^{14} lines.m^{-2}	Micro-strain × 10^{-4}
27.18	0.29	28.03	12.72316	12.3595
28.06	0.18	45.25	4.883003	7.65679
31.56	0.25	32.85	9.26584	10.54741
45.26	0.13	65.89	2.302916	5.258262
56.3	0.2	44.86	4.968808	7.723771

(Fatima I., 2017). Reaction Surface Approach (RSM), as a blend of arithmetic and measurements, is a helpful procedure for demonstrating and breaking down a reliant variable, which is impacted by numerous free criteria (Jafari N., 2017). In this manner, the present investigation concentrated on (1) the investigation of the optical synthesis and portrayal of particles of the Vera plant utilizing a straightforward technique.

Materials and Methods

(AV) plant extricate was utilized as crude materials. The (AV) separate arrangement was readied utilizing 10 grams of *Aloe vera* leaves that were flushed with deionized water and cut into little pieces see fig. 1. Hacked desert flora leaves were bubbled in 50 ml of deionized water for 20 minutes and permitted to cool. The cooled stock soup was sifted and put away in the cooler at 4°C. *Aloe vera* separate eyeliner extricate was used, see fig. 1.

A drop casting method has been used to deposit the *Aloe vera* solution onto the glass substrate see fig. 2. This method is best applied to form a variety of thin films and allows high throughput from a simple device and no material is lost.

Results and Discussions

XRD was performed utilizing a Philips PW-304 X-beam diffract meter, with a CuKα radiation source (λ = 1.5417 An); a checking pace of 0.02°/s was ° used to record the example in the 2θ scope of 9-75°. The significant diffraction tops for Aloe Vera 1 were at 28.060°, 31.540° and 45.210°. The ° XRD designs are appeared in fig. 3 and the recognized segments are recorded in table 1.

Fig. 1: Photo image of Aloe Vera.

Through "Debye-Scherer's equation'', it was estimated the crystallite size (Ehssan S. Hassana, 2018):

$$G_s = \frac{0.9\,\lambda}{\beta\cos(\theta)} \qquad ...1$$

θ is the diffraction angle and β is FWHM. It can use the equations (2, 3) to calculate the dislocation density (s) and the micro strain (Ehssan S. Hassana, 2018), see table 1:

$$\eta = \frac{\beta\cos\theta}{4} \qquad ...2$$

$$\delta = \frac{1}{G_s^{\,2}} \qquad ...3$$

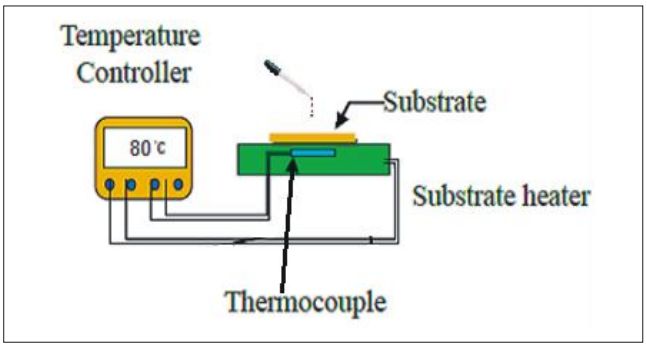

Fig. 2: Diagram drop casting method.

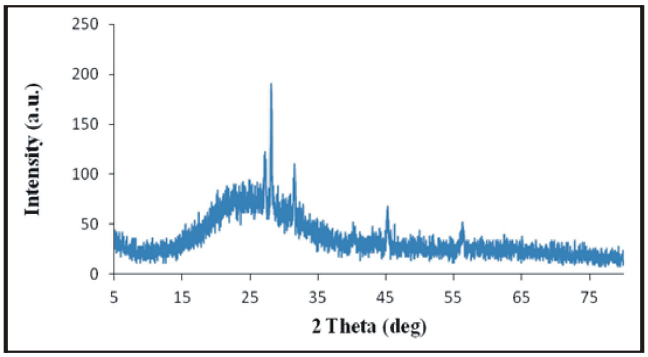

Fig. 3: XRD pattern of Aloe Vera thin film.

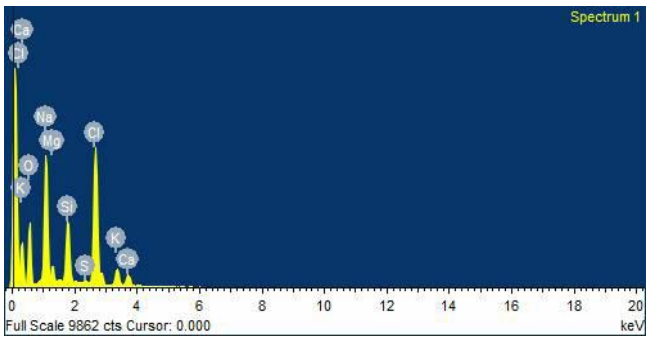

Fig. 4: EDX results for Aloe Vera thin film.

EDX examination demonstrated that the AV layers contained C, O_2, Al, amphitheater Ca, K, Cu and different components. Table 1 condenses the weight rates of distinguished materials in the AV. In view of high mass rates of O in the gels, it tends to be accepted that Al, Ca, K and Si are available in oxide structure; different components may frame different mixes. The EDX results for (AV) appeared in fig. 4.

The SEM micrographs in fig. 5 unmistakably show that the (AV) film comprises of natural strands and particles with sporadic and squashed shape and pores of rang of 300 to 500 µm.

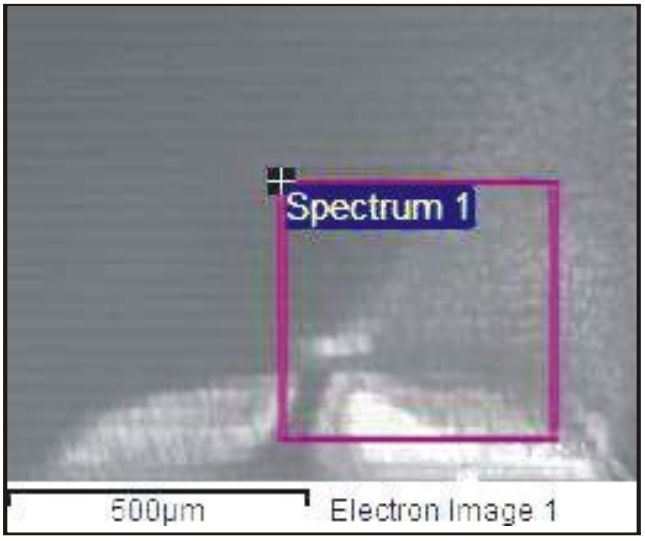

Fig. 5: EM image for (AV) thin film.

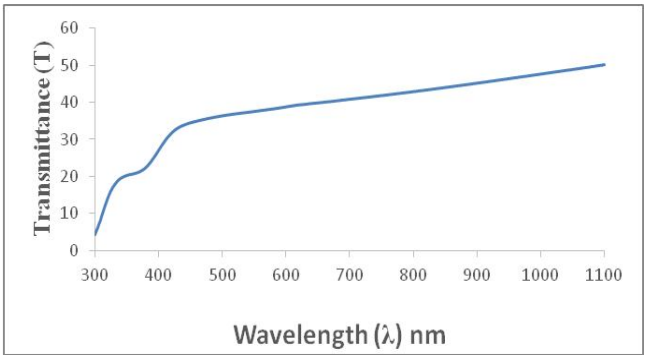

Fig. 6: T versus (λ) for *Aloe vera* thin film.

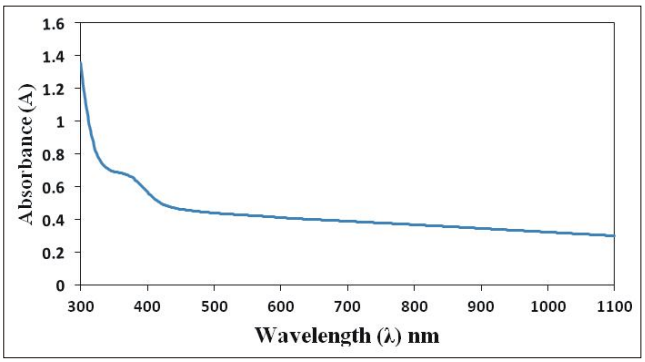

Fig. 7: A versus (λ) for Aloe Vera thin film.

Optical assimilation curve of the movies in the range of (290-1100 nm) were measured by utilizing UV–unmistakable spectrophotometer. The examination of the reliance of retention coefficient on photon vitality in the high assimilation areas is performed to get point by point data about the vitality band holes of the movies. fig. 6 shows the connection among transmittance and wavelength for *Aloe vera* flimsy film. It tends to be seen that the transmittance increments quickly as the wavelength increments. The film has high straight forwardness in the noticeable and close to IR scale.

Fig. 7, shows the connection between absorbance (An) and wavelength for the saved (AV) thin film. The absorbance diminishes quickly at high wavelengths relating to the vitality hole of the film. This clear increment of vitality is because of the association of electrons of material with the episode photons have enough vitality for electron event advances.

α (absorption coefficient) calculated from the absorbance using law (Mazin H. Hasan, 2019):

$$\alpha = (2.303 \times A) / t \quad ...4$$

A is the absorbance for thickness (t) and (α) is the absorption coefficient. It have been noticed that the prepared thin film has high absorption coefficient in VIS of spectrum and this could be seen in fig. 8. α decrease

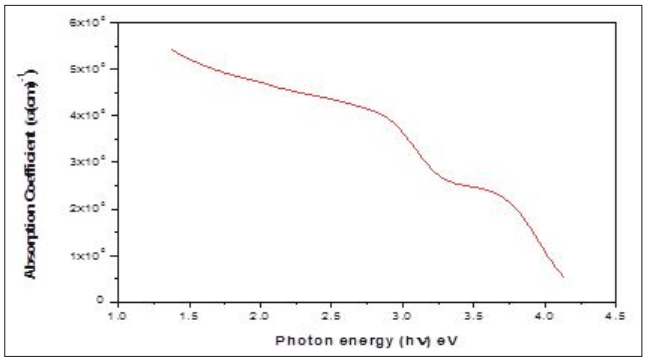

Fig. 8: α versus energy of photon for (AV) thin film.

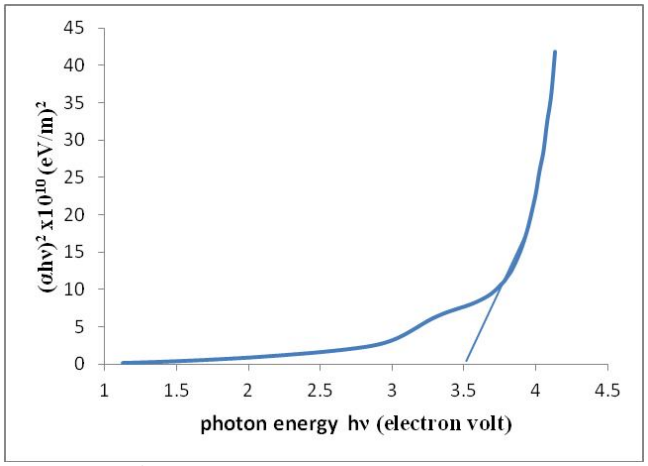

Fig. 9: $(\alpha h\nu)^2$ and (hν) for *Aloe vera* thin film.

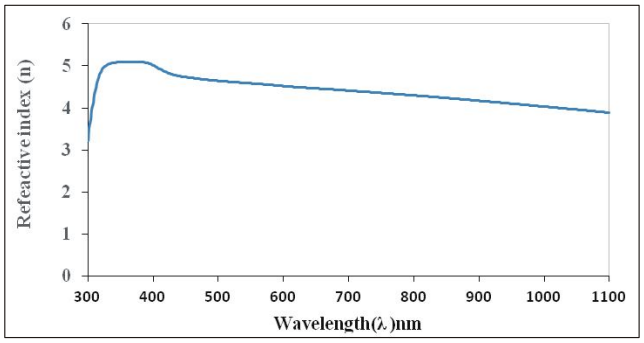

Fig. 10: n versus wavelength of *Aloe vera* thin film.

with decrease in photon energy. The α of the deposited thin film have value of 10^4 1/cm, also, it have been noticed that prepared thin film has high α is 10^5 (1/cm) in VIS range and the NIR spectral range.

(E_g) is given by the classical relation (Mazin H. Hasan, 2019):

$$\alpha h\nu = C\ (h\nu - E_g^{opt.})^M \quad ...5$$

where α is the ingestion coefficient, hν is the photon vitality, Eg is the optical band hole, C will be a consistent which doesn't rely upon photon vitality and M has four numeric qualities 0.5 for permitted immediate, 2 for permitted backhanded, 3 for illegal immediate and (1.5) for taboo circuitous optical changes. In this work, direct band hole was dictated by plotting a chart among $(\alpha h\nu)^2$ and (hν) in eV, a straight line is gotten which gives the estimation of the immediate band hole. The extrapolation of straight line to $(\alpha h\nu)^2 = 0$ gives estimation of the immediate band hole of the material and this could be found in fig. 9. We notice that the band hole esteem is equivalent (3.5) eV for (AV) thin film.

n has been calculated using the relation (Mazin H. Hasan, 2019):

$$n = \left[\frac{(1+R)^2}{(1-R)^2} - (k_o^2 - 1)\right]^{1/2} + \frac{(1+R)}{(1-R)} \quad ...6$$

where n is the refractive list, R is the reflectance and k_o is the elimination coefficient. The connection between refractive file and wavelength for flimsy movies at is appeared in fig. 10.

It tends to be seen that the refractive record of the readied film have esteem (5). The expansion in the refractive file is a mark of the film densification and crystalline improvement.

Conclusion

The present work has reached at the following conclusions:

The synthesized *Aloe vera* thin film environmental safety and low cost. prepared by simple chemical method. The characteristics of the thin film depend on the method. Also, X-ray diffraction (XRD) measurement disclosed that the thin film is polycrystalline.

References

Benstoem, C., A. Goetzenich, S. Kraemer, S. Borosch, W. Manzanares and G. Hardy *et al*., (2015). Selenium and its supplementation in cardiovascular *disease-Nutrients*, **7:** 3094-3118.

Chen, H., J.B. Yoo, Y. Liu and G. Zhao (2011). Green synthesis and characterization of Se nano-particles and nanorods. *Electron Mater. Lett*., **7:** 333-336.

Chen, W., Y. Li, S. Yang, L. Yue, Q. Jiang and W. Xia (2015). Synthesis and antioxidant properties of chitosan and carboxymethyl chitosan-stabilized selenium nanoparticles. *Carbohydras. Polym*., **132:** 574-581.

Ehssan S. Hassana, Ahmed N. Abda, Nadir F. Habubib, Hazim L. Mansourb (2018). Sensing properties controlled by thickness variable of palladiumoxide synthesized by RF-reactive sputtering: *Optik*: **174:** 481-488. December 2018.

Falandysz, J. (2008). Selenium in edible mushrooms. *J. Environ. Sci. Health, part C: Environ. Carcinog. Ecotoxicol. Rev*., **26:** 256-299.

Fatimah, I. (2016). Green synthesis of silver nanoparticles using extract of *Parkia speciosa* Hassk pods assisted by microwave irradiation. *J. Adv. Res*., **7:** 961-969.

Fayet-Moore, F., P. Petocz and S. Samman (2014). Micronutrient status in female university students: Iron, zinc, copper, selenium, vitamin b(12) and folate. *Nutrients.*, **6:** 5103-5116.

Jafari, N., H. Jafarizadeh-Malmiri, M. Hamzeh-mivehroud and M. Adibpour (2017). Optimization of UV irradiation mutation conditions for cellulase production by mutant fungal strains of *Aspergillus niger* through solid state fermentation. *Green Process. Synth*., **6:** 334-340.

Mazin, H. Hasan, T. Ibrahim Fuad and Naji Abd Ahmed (2019). Investigation of Nanostructured and Gas Sensing of Tin Dioxide (Sno2) Films Prepared by Oxidation of Sn: *Iraqi Journal of Science.*, **60(4):** 745-753.

McClements, J. and D.J. McClements (2016). Standardization of nanoparticle characterization: methods for testing properties, stability and functionality of edible nanoparticles. *Crit. Rev. Food Sci. Nutr*., **56:** 1334-1362.

Prasad, K.S., H. Patel, T. Patel, K. Patel and K. Selvaraj (2013). Biosynthesis of Se nanoparticles and its effect on UV-induced DNA damage. *Colloids Surf. B Biointerfaces.*, **103:** 261-266.

Sánchez-Machado, D.I., J. López-Cervantes, R. Sendón and A. Sanches-Silva (2017). Aloe vera Ancient knowledge with new frontiers. *Trends Food Sci. Technol*., **61:** 94-102.

Zhou, Y., M. Xu, Y. Liu, Y. Bai, Y. Deng and J. Liu *et al*., (2016). Green synthesis of Se/Ru alloy nano-particles using gallic acid and evaluation of theiranti-invasive effects in HeLa cells. *Colloids Surf. B. Biointerfaces.*, **144:** 118-124.