iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 4 **Issue:** IX **Month of publication:** September 2016

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Transmission Spectra of PANI and PANI on ZnS

Jitendra singh[1], Pushpendra Singh[2], Kapil Sirohi[3]
[1]*Dept.of Physics, K.G.K.(P.G.)College, Moradabad,(U.P.)India*
[2]*Dept.of Applied Science, TMU, Moradabad,(U.P.)India*
[3]*Dept.of Basic Education, Moradabad,(U.P.)India*

Abstract--In the present investigation, the films of Zinc Sulphide and Polyaniline have been prepared by vacuum evaporation methods.The growth and characterization of single layer and multilayer films have been done. Results are reported in terms of transmission spectra of PANI and PANI/ZnS thin films.
Key Words--ZnS thin films, Vaccum Evaporation Technique.Transmission Spectra

I. INTRODUCTION

The sulphide semiconductors are one of the most extensively investigated semiconductor in thin film form and a large variety of deposition techniques have been utilized to obtain solar cells. ZnS is the II–VI family semiconductor, has wide band gap (3.65 eV) at room temperature and large excitation binding energy 60 meV, ZnS is an attractive semiconductor material especially in electronic and optoelectronic application. The dielectric constant of ZnS (wurtzite structure) is 8.75 at lower frequencies and 3.8 at higher frequencies. The molecular mass is 81.389 and the melting temperature is 1450 K. ZnS was used by Ernest Rutherford and others in the early years of nuclear physics as a scintillation detector, because it emits light on excitation by x-rays or electron beam, making it useful for x-ray screens and cathode ray tubes.It also exhibits phosphorescence due to impurities on illumination with blue or ultraviolet light. Zinc sulfide, with addition of few ppm of suitable activator, is used as phosphor in many applications, from cathode ray tubes through x-ray screens to glow in the dark products.When silver is used as activator, the resulting color is bright blue, with maximum at 450 nm. Manganese yields an orange-red color at around 590 nm. Copper provides long glow time and the familiar glow-in-the-dark greenish color. Copper doped zinc sulfide (ZnS+Cu) is also used in electroluminescent panels .
Zinc sulfide is also used as an infrared optical material, transmitting from visible wavelengths to over 12 micrometres. It can be used planar as an optical window or shaped into a lens. It is made as microcrystalline sheets by the synthesis from H_2S gas and zinc vapor and sold as FLIR (Forward Looking IR) grade ZnS in a pale milky yellow visibly opaque form.This material when hot isostatically pressed (HIPed) can be converted to a water-clear form known as Cleartran (trademark). Early commercial forms were marketed as Irtran-2 but this designation is now obsolete.

II. SAMPLE PREPARATION OF ZNS

Thin films of ZnS have been prepared by vacuum deposition technique. For sample preparation Zinc Sulphide powder of 99.99%. purity was evaporated at about 115°C from a deep narrow mouthed molybdenum boat. Deposition was made on to highly cleaned glass substrate held at 200°C in a vacuum of 10^{-5} torr. The substrate was cleaned in aquaregia washed in distilled water and isopropyl alcohol (IPA). We have used glass substrate for the preparation of Zinc Sulphide.

III. SAMPLE PREPARATION OF POLY ANILINE

Thin film of polyaniline have been prepared by vacuum evaporation technique, polyaniline is usually prepared by redox polymerization of aniline using ammonium perdisulphate, $(NH4)_2\ S_2O_2$ as on oxidant. Distilled aniline (0.02 M) is dissolved in 300 ml of pre-cooled HC1 (l.0M) solution, maintained at 0-50°C. A calculated amount of ammonium perdisulphate, (0.05M) dissolved in 200 ml of HCl (1M), pre-coated to 0-50° C, is added to the above solution. The dark green precipitate (ppt) resulting from this reaction is washed with HC1 (l.OM) uptil the green colour disappears. This ppt is further extracted with terta-hydofuran and NMP (N-Methyl Pyrolidinone) solution by soxhelf extraction and dried to yield the emeraldine salt. Emeraldine base can be obtained by heating the emeraldine salt with ammonia solution. Simultaneously, separate salt solution is prepared by dissolving the MX (M=Metal and X=Halide) in distilled water. The solution is then slowly added to the precooled polymer solution with constant stirring. The composite is then dried in an oven, at high temperature, to get the conducting polymer in the powder form. This powder is vacuum evaporated on to highly cleaned glass substrate as well as metallic substrate.

Volume 4 Issue IX, September 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

IV. TRANSMISSION SPECTRA

Optical transmission spectroscopy can be used to determine the optical constant (h, k,l) thickness and band gap for the thin films. Its limitations are that we cannot measure optical constant, and band gap of a bulk material. Let a light beam of intensity I_0 be made incident on a surface, and I be the intensity of transmitted beam, then the ratio of transmitted to incident intensity I / I_0 is termed as the transmission coefficient. If α is the absorption coefficient, t is the thickness and R is the reflectivity then the radiation transversing the first interface is $(1-R) I_0$. The radiation reaching the second interface is $(1-R) I_0 \exp(-\alpha t)$ and only a fraction of $(1-R)(1+R) I_0 \exp(-\alpha t)$ emerges .The internally reflected portion comes out after a considerable attenuation .
Thus the resultant i.e. the over all transmission is given by:

$$T = \frac{(1- R)^2 \exp (- \alpha t)}{1-R^2 \exp. (-2\alpha t)} \quad \text{---- (1)}$$

When the project αt is large, the second term in the denominator can be neglected such that

$$T= (1-R)^{2\exp} (-\alpha t) \quad \text{------ (2)}$$

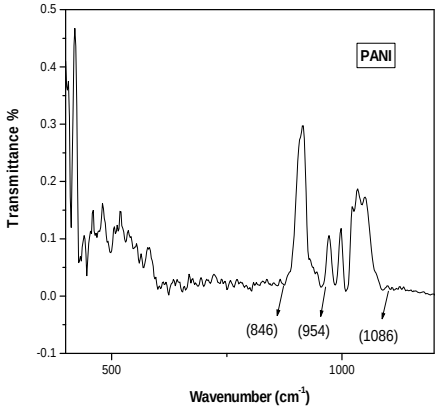


Fig.1: Transmission spectra of Polyaniline

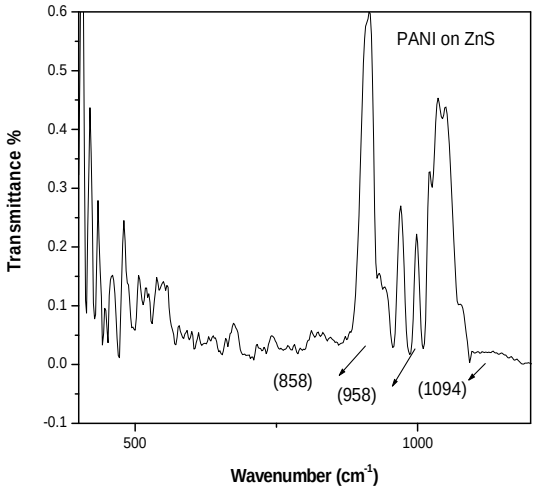


Fig.2: Transmission spectra of PANI on ZnS

Table 4.1 Assignment of IR absorption bands of Polyaniline

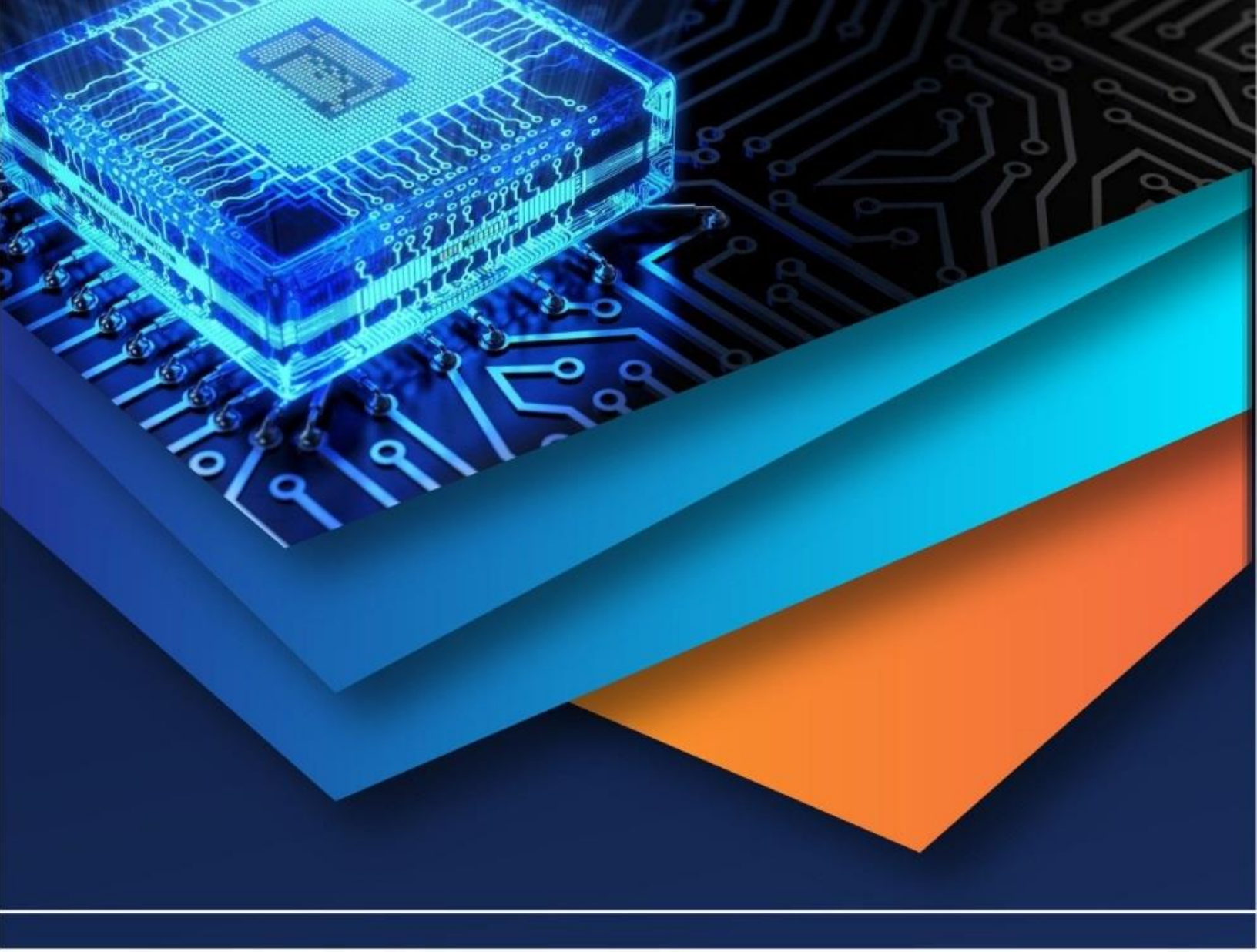
Wave number Cm^{-1}	Assignment
846	C-H out- of- plane bending of 1,4-ring
954	C-H out- of- plane bending of 1,2,4-ring
1086	a mode of N=Q=N

V. RESULTS AND DISCUSSIONS

Figure1&2, shows the FTIR spectra of pure PANI and PANI on ZnS. The characteristic dips at 846,954 and 1086 Cm^{-1} appears in the FTIR spectrum of the PANI, these characteristic dips are matched with the standard FTIR Spectrum of PANI [Table 4.1]. In the FTIR spectrum of PANI on ZnS, the characteristic dips 858, 958 and 1094 cm^{-1} shifting towards higher wave numbers, in comparison to the corresponding dips of PANI. This seems due to the hydrogen action existing between the ZnS particles and PANI.

REFERENCES

[1] Advincula, R.C et al. MRS Proceeding Fall 1997.
[2] R.P Sharma, M.S Raghuwanshi, and S.D Chavan Thin Films and Semiconductor laboratory research center. G.T Patil college Nandurbar
[3] R.P Sharma, Semiconductor Devices, Krishan Lal (Ed.) Marosa Publishing House, New Delhi (1996 P. 394-396.
[4] Jayachandram, M.; Paramasivam, M; Murali, K.R.; Trivedi, D.C.; Raghavan, M. Mater. Phys. Mech. 2001, 4, 143.
[5] "Structural and optical properties of Znic Sulphide Sintered films" Vipin Kumar, Seema Sirohi and T.P Sharma, NSCMDA-98,Guru Nanak dev University, Amritsar, (March 4-6, 1998) P.5.
[6] N.F Foster etc. J.Appl. Phys.38, (197), 149.
[7] C. Suryanaryana and M. Grantnorton, X-ray diffraction : A Practical App- roach, (Plenum Publishing Corporation, New York, 1998).
[8] Schlamp, M.C.; Xiaogang, P.; Alivisatos, A.P. J.Appl.Phys. 1997, 82, 5837.
[9] Y. Drezner, S. Berger and M. Hefetz ; Mat Sc and Eng., B 18, (2001) 59.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY