بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــسـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

ON SOME PHYSICAL PROPERTIES OF $GeSe_3$-Sb_2Se_3-ZnSe THIN FILMS AND THEIR RADIATION RESPONSE

Presented by

Hany Mohamad Moharam Ali Hosni

NCRRT, Atomic Energy Authority

B.Sc., 1995

M.Sc., 2004

Faculty of Science

Cairo University

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Thesis Title: "On some Physical Properties of $GeSe_3$-Sb_2Se_3-ZnSe Thin Films and Their Radiation Response"

Name of candidate: Hany Mohamad Moharam Ali Hosni

This thesis has been approved for submission by the supervisors:

1- **Prof. Dr.** Mohamed Amin Soliman

Signature: M. Amin

2- **Prof. Dr.** Sanaa Ahmed Fayek

Signature: Sanaa Fayek

3- **Prof. Dr.** Mohamed Roushdy Sabry

Signature: M. Roushdy

4- **Assist. Prof. Dr.** Mohamed Ragaa Balboul

Signature: M.R.Balboul

Prof. Dr. G. M. Nasr

G.M.Nasr

Chairman of Physics Department

Faculty of Science-Cairo University

ABSTRACT

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Student Name: Hany Mohamad Moharam Ali Hosni

Title of the thesis: "On some Physical Properties of $GeSe_3$-Sb_2Se_3-ZnSe Thin Films and Their Radiation Response"

Degree: Ph.D. in Science (Physics)

Thin films of the chalcogenides $GeSe_3$, Sb_2Se_3, $ZnSe$, $(GeSe_3)_{80}(Sb_2Se_3)_{20}$ and $(GeSe_3)_{70}(Sb_2Se_3)_{10}(ZnSe)_{20}$, are prepared by thermal evaporation onto glass substrates. The effect of $ZnSe$ incorporation with both $GeSe_3$, Sb_2Se_3 results in amorphous $(GeSe_3)_{70}(Sb_2Se_3)_{10}(ZnSe)_{20}$ composition as obtained from the X-ray analysis. Electrical measurements reveal a decrease in dc activation energy, ΔE_{dc}, and an increase in ac activation energy, ΔE_{ac}, for $(GeSe_3)_{70}(Sb_2Se_3)_{10}(ZnSe)_{20}$ as compared with $(GeSe_3)_{80}(Sb_2Se_3)_{20}$. Optical energy gap, E_g, and band tail width, E_e, are estimated in UV/VIS spectral region for fresh and γ-irradiated films, revealing a decrease in E_g and an increase in E_e for $ZnSe$ and $(GeSe_3)_{70}(Sb_2Se_3)_{10}(ZnSe)_{20}$ compositions, with irradiation dose.

Keywords: Chalcogenide Semiconductors, Optical Properties, DC and AC Electrical Properties, Gamma Irradiation.

Supervisors: **Signature**

1- **Prof. Dr.** Mohamed Amin Soliman
2- **Prof. Dr.** Sanaa Ahmed Fayek
3- **Prof. Dr.** Mohamed Roushdy Sabry
4- **Assist. Prof. Dr.** Mohamed Ragaa Balboul

Prof. Dr. G. M. Nasr

Chairman of Physics Department

Faculty of Science-Cairo University

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H. M. Hosni

LIST OF ABBREVIATIONS

Absorption coefficient	$\alpha(\omega)$
AC activation energy	ΔE_{ac}
AC electrical conductivity	σ_{ac}
Amorphous semiconductors	*ASC's*
Angular frequency	ω
Anti-bonding states	σ^*
Atomic scattering factor	f
Average coordination number	$<r>$
Average density value	ρ_o
Background intensity	$I_b(\theta)$
Band tail width	E_e
Boltzmann constant	k
Bonding states	σ
Bragg's diffraction angle	θ
Carrier Barrier Hopping	*CBH*
Carrier mobility	$\mu(E)$
Characteristic tunneling distance	R_ω
Coefficient of wavefunction's exponential decay	β
Coherent scattered intensity	$I_{coh}(Q)$
Cohesive Energy	*CE*
Complex dielectric constant	$\varepsilon(\omega)$
Complex optical dielectric constant	ξ
Complex refractive index	$\tilde{n}$
Conduction band density of states	N_c
Conduction band edge	E_c

Conduction Band	$C.B.$
Continuous Random Network	CRN
Corrected intensity	$I_c(\theta)$
Crystallization temperature	T_c
Cycle per second	cps
Dangling bond defect	D
DC activation energy	ΔE_{dc}
DC electrical conductivity	σ_{dc}
Density of states	$N(E)$
Dielectric constant	ε_1
Dielectric loss	ε_2
Differential Thermal Analysis	DTA
Dispersion energy	E_d
Distance between the electrodes	L
Effective energy	U_{eff}
Electric polarization	P
Electrode length	b
Electron mass	m
Electron wave vector	K
Electronic charge	e
Electron's effective mass	m^*
Energy Dispersive X-ray	EDX
Experimentally calculated density	ρ_{exp}
Extinction coefficient	κ
Fermi level	E_F
Film thickness	t
Final energy state	E_f
Free space capacitance	C_o
Full Width at Half Maximum	$FWHM$

Glass transition temperature..... T_g

Hubbard energy..... U

Imaginary part of the optical dielectric constant..... ξ_2

Impedance..... Z

Incoherent scattering..... $I^{inc}(Q)$

Infinite effective barrier height..... W_M

Initial energy state..... E_i

Interplanar distance..... d

Lattice high frequency dielectric constant..... ξ_L

Lone Pair ..... LP

Loss tangent..... $tan\delta$

Magnitude of the scattering vector..... Q

Matrix element for the optical transition..... $\langle f|M|i\rangle$

Mean square perturbation energy..... $\langle U^2 \rangle$

Melting temperature..... T_m

Molecular Beam Epitaxy..... MBE

Observed intensity..... $I_{obs}(\theta)$

Optical energy gap..... E_g

Optical transmission maximum..... T_{max}

Optical transmission minimum..... T_{min}

Optical transmittance..... T

Oscillator energy..... E_o

Permittivity of space..... ε_o

Phase angle between voltage and current..... Φ

Phonon frequency..... ν_{ph}

Photon frequency..... ν

Plank's constant/2π..... $\hbar$

Polarizability..... α_p

Polaron energy	W_p
Polaron radius	r_o
Polaron transfer activation energy	W_H
Quantum Mechanical Tunneling	QMT
Radial density function	$\rho(r)$
Radial distribution function	$J(r)$
Ratio of the free carrier concentration to the electron effective mass	N/m^*
Real part of the optical dielectric constant	ξ_1
Reduced radial distribution function	$G(r)$
Reduced scattering intensity	$F(Q)$
Refractive index of the substrate	n_s
Refractive index	n
Relaxation time	τ
Speed of light	c
States Density Theory	SDT
Theoretically calculated density	ρ_{cal}
Total attenuation coefficient	μ_A
Total conductivity	σ_{tot}
Valance band density of states	N_v
Valence band edge	E_v
Valence Band	$V.B.$
Wavelength	λ
Wave's phase angle	φ
X-Ray Diffraction	XRD

LIST OF TABLES