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شبكة المعلومات الجامعية



شبكة المعلومات الجامعية

التوثيق الالكتروني والميكرو فيلم

جامعة عين شمس

التوثيق الالكتروني والميكرو فيلم

قسم

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بالرسالة صفحات
لم ترد بالأصل

ON SOME PHYSICAL PROPERTIES OF GeSe₃-Sb₂Se₃-ZnSe THIN FILMS AND THEIR RADIATION RESPONSE

Presented by

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A Thesis Submitted

to

Faculty of Science

For the Degree of

Ph.D. in Science

(Physics)

Physics Department

Faculty of Science

Cairo University

(2010)

B o.k.g

APPROVAL SHEET FOR SUBMISSION

Thesis Title: "On some Physical Properties of $\text{GeSe}_3\text{-Sb}_2\text{Se}_3\text{-ZnSe}$ Thin Films and Their Radiation Response"

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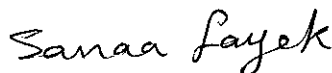
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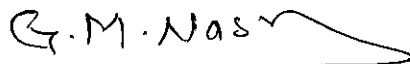


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ABSTRACT

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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 , $(\text{GeSe}_3)_{80}(\text{Sb}_2\text{Se}_3)_{20}$ and $(\text{GeSe}_3)_{70}(\text{Sb}_2\text{Se}_3)_{10}(\text{ZnSe})_{20}$, are prepared by thermal evaporation onto glass substrates. The effect of ZnSe incorporation with both GeSe_3 , Sb_2Se_3 results in amorphous $(\text{GeSe}_3)_{70}(\text{Sb}_2\text{Se}_3)_{10}(\text{ZnSe})_{20}$ 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 $(\text{GeSe}_3)_{70}(\text{Sb}_2\text{Se}_3)_{10}(\text{ZnSe})_{20}$ as compared with $(\text{GeSe}_3)_{80}(\text{Sb}_2\text{Se}_3)_{20}$. 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 $(\text{GeSe}_3)_{70}(\text{Sb}_2\text{Se}_3)_{10}(\text{ZnSe})_{20}$ compositions, with irradiation dose.

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

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ACKNOWLEDGEMENT

This work has been carried out under the supervision of Prof. Dr. Mohamed A. Soliman, Physics Department, Faculty of Science, Cairo University, Prof. Dr. Sanaa A. Fayek, Solid State Department, National Centre for Radiation Research and Technology, Atomic Energy Authority, Prof. Dr. Mohamed R. Sabry, Physics Department, Faculty of Science, Cairo University and Assist. Prof. Dr. Mohamed R. Balboul, Solid State Department, National Centre for Radiation Research and Technology, Atomic Energy Authority.

The author wishes to express his deep appreciation and sincere gratitude to them for suggesting the problem, supervision, valuable suggestions and help throughout the work and preparation of the thesis.

Thanks also due to my colleagues and all staff members in the Solid State Department in the National Centre for Radiation Research and Technology, Atomic Energy Authority.

Last but not least, I would like to thank Prof. Dr. Gamal M. Nasr, Chairman of Physics Department, Faculty of Science, Cairo University, for his encouragement and for providing the necessary facilities.

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.....	$\langle r \rangle$
Average density value.....	ρ_0
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_l
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

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