Curriculum Vitae

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Name Abhay Kumar Singh **Nationality** Indian

Present position Senior Research Associate Department of Mechanical Engineering, University of Johannesburg, South Africa (1 June 2021 to till date)

Awards/Fellowships

- Post doctoral fellow, Department of Mechanical Engineering, University of Johannesburg, South Africa (4 June 2018 to 31 May 2021)
- Senior Research Associate Department of Mechanical Engineering, University of Johannesburg, South Africa (1 oct 2017 to 3 June 2018)
- Assistant Professor **(**Guest faculty), Department of Physics, Mahatma Gandhi Kashi Vidhyapith (Jan 2018 to May 2018)
- Assistant Professor, Lovely Professional University, Jalndhar, Punjab, India (Aug.2015 to Feb2016)
- 2014-May to Feb.2015, Korean BK21 Program Post Doctoral fellow
- 2011-2014 (Aug -May) Dr. D.S.Kothari Post-Doctoral Fellow (UGC, New Delhi)
- 2010-2011 (Dec-July) Post PhD researcher
- 2006-2009 (Oct-June) Senior Research Scholar (CSIR, New Delhi)
- 2004-2005 (Feb-Jan) Project Assistant (National Metallurgical Laboratory, Jamshedpur, India)

Achievements

- Member of Editorial Board: Science and Engineering Applications (SAEA)
- Member of Editorial Board: Characterization and Application of Nanomaterials
- Member of Editorial Board: Advanced Energy Conversion Materials
- Member of Editorial Board: Current Graphene Science
- Member of Editorial Board: Current Materials Science

Research Guidance

- Master students: 2
- Under graduate: 2

Running Project

"Scheming and production of novel technologically vital materials for optoelectronic device applications" R.G.P.1-102-42, KING KHALID UNIVERSITY, KINGDOM OF SAUDI ARABIA
Jan 2021 to Jan2022
Amount : 50000 SAR
Role: Co-PI

DETAILS OF RESEARCH ACTIVITIES

Area of Interest

- Chalcogenide photovoltaics
- Synthesis and characterizations of CZTS, CZTSSe photovoltaic nano materials
- Synthesis and characterizations of CIGS like photovoltaic bulk materials

- Synthesis and characterizations of CIGS like photovoltaic nano materials
- Synthesis and characterizations of chalcogenide –carbon nano tubes and graphene composite materials
- Synthesis and characterization of binary Se-In chalcogenide glasses and the possible correlation between thermal, electrical, optical and structural properties.
- Synthesis and thermal, electrical, optical, structural characterization of new ternary Se-Zn-In chalcogenide glasses.
- Synthesis and thermal, electrical, optical, structural characterization of new multicomponent Se-Zn-Te-In chalcogenide glasses
- Microstructure –glass structure and physical propretés corrélations
- Process of Hot dip glavanizing and their coating layer analysis from metlographic method.

Equipment Handled/Experimental Techniques Employed (a) Regarding Synthesis of Materials

- Extensive experience on nano photovoltaic materials like CIGS, CIGST, CZTS, CZTSSe
- Extensive experience with preparation of bulk binary, ternary and multi component chalcogenide glasses from melt quenched method
- Vacuum Systems (Hind Hivac et)

- Industrial process of hot dip galvanizing

(b) Instruments Handled / Acquaintance

i) Working knowledge

- Extensive working experience with Differential Scanning Calorimetry (DSC, SHIMAZADU, Japan; Model TA 60)
- Extensive working experience on thermal evaporation thin film coating method
- Extensive working experience on pulse laser deposition (PLD) technique
- Extensive working experience with spin coating
- Extensive working experience with doctor blade coating
- Extensive working experience on Transient Plane Source (TPS)
- Working experience on Raman equipment
- Extensive working experience on Optical Image Analyzer (Metal Power)
- Extensive working experience on Atomic Absorption Spectrometer (AAS) (Lee Man-Pulsar)
- Extensive working experience on diamond grade cutting and Mounting (Macapress- France)
- Extensive working experience on metal polishing up to diamond grade (Macapole, Prace/France)
- I-V measurements by employing Keithley setup.
- Dielectric measurements by Wayne-Keer, LCR-Meter

ii) Frequently used equipment's

- X-ray diffractometer (Philips; PW 1710)
- UV/Visible spectrometer (SHIMADZU, UV-1700)
- FT-IR
- Scanning Electron Microscope
- Energy Dispersive analysis of X-rays
- Field Emission Scanning Microscope (FSEM)
- Transmission Electron Microscope (TEM)
- Atomic Force Microscope (AFM)
- Differntial Thermal Analyzer (DTA)

Computer Handling Skill Basic Knowledge scientific software packages (e.g Origin, MS Office etc)

LIST OF PUBLICATIONS

(a) List of Publications in Referred Journals

Sr. No.	Full reference of Research Papers
1	K.R. Ngoy, A.K. Singh, T.C. Jen, Impact of doping concentration, thickness, and band gap on individual layer efficiency of CIGS solar cell, Functional Materials Letters, (2021) (Accepted)
2	MohdShkir, Kamlesh V.Chandekar, AslamKhan, T.Alshahrani, AhmedMohamed El-Toni, M.A.Sayed, A.K.Singh, Anees A.Ansari, M.R.Muthumareeswaran, AliAldalbahi, Ravindra KumarGupta, S.AlFaify; Tailoring the structure-morphology-vibrational-optical-dielectric and electrical characteristics of Ce@NiO NPs produced by facile combustion route for optoelectronics, Materials Science in Semiconductor Processing, 126, 105647 (2021).
3	Abhay Kumar Singh, Tien-Chien Jen; A Roadmap for the Chalcogenide-graphene Composites Formation Under a Glassy Regime, Current Graphene Science, 3 (1), 49-55 (2020).
4	Abhay Kumar Singh, Tien-Chien Jen; Impact of MWCNT and GF incorporation on optical properties of GTS alloy, Journal of Micro and nanosystems – 12, 1-8 (2020).
5	Abhay Kumar Singh, Tanka R. Rana, JunHo Kim, M. Shkir, Tien-Chien Jen ; Impact on Structural and Optical Properties of CZTS Thin films with Solvents and Ge Incorporation, International Journal of Photoenergy, Volume 2021, Article ID 1508469, 1-9.
6	Abhay Kumar Singh, Tien-Chien Jen; Study on doctor blade and spin coated $CuInGaSe_2$ thin films, Characterization and Application of Nanomaterials, 2 (1), 1-7 (2018)
7	Abhay Kumar Singh, Tien-Chien Jen; Structural, optical properties of spin-coated CIG/SLG,CIGS/SLG, CIGS/Mo/SLG thin Films, Surface Engineering, doi.org/10.1080/02670844.2018.1535787
8	Abhay Kumar Singh, P. Senthamarai, R. Ganesan; Composition dependence structural and optical properties of the CuInGaSe nanocrystals, Science and Engineering

	Applications, 1 (3), 1-8 (2016)
9	Abhay Kumar Singh, JunHo Kim, Jong Tae Park ; Cu (InGa) SeTe Nanocrystals Structural and Optical Properties, Journal of Nanomaterials & Molecular Nanotechnology, 4(5), 1-7 (2015)
10	Abhay Kumar Singh, R.Ganesan, Jong Tae Park; Structural, optical and electrical properties of Cu(InGa)SeTe device with the varying laser pulses, Advanced Materials Letters 6 (6), 513-517 (2015)
11	Abhay Kumar Singh, Jong Tae Park; Laser Pulses Dependent Thickness and Properties of the Cds Buffer Layer, Elixir, 93, 39450- 39453 (2016)
12	Abhay Kumar Singh, Jun Ho Kim, Jong Tae Park, K.S. Sangunni; Properties of the chalcogenidecarbon nano tubes and graphene composite materials, Journal of Alloys and Compounds, 627 (5), 468-475 (2015)
13	Abhay Kumar Singh; Optical properties of the chalcogenide-MWCNT and GF composite materials, Journal of nano enegineering and manufacturing 4 (3), 200 – 204 (2014)
14	Abhay Kumar Singh; Comparative Study on Structural and Electrical Properties of Se-Zn- In and Se-Zn-Te-In Chalcogenide Glasses, Advances in Optoelectronic Materials, 2 (1), 1-10 (2014)
15	Abhay Kumar Singh; A Few Prospective Compositions for Chalcogenide Photovoltaics, Journal of Photonics and Optoelectronics, 2 (3), 43-55 (2013) 2304-1072
16	Abhay Kumar Singh; Crystallization kinetics of Se-Zn-Sb nano composites chalcogenide alloys, Journal of Alloys and Compounds, 552, 166-172 (2013)
17	Abhay Kumar Singh; A comparative study on optical properties of Se- Zn-In and Se-Zn- Te-In chalcogenide glasses, optik,124 (15) 2187-2190 (2013)
18	Abhay Kumar Singh; SeZnSb alloy and its nano tubes, graphene composites properties, AIP Advances, 3, 42124- 11 (2013)
19	Abhay Kumar Singh; Structural and Optical Characterizations of CIGST Solar Cell Materials, World Academy of Science, Engineering and Technology, International Journal of Mathematical, Computational, Physical, Electrical and Computer Engineering 7 (1) 70-74 (2013)
20	Abhay Kumar Singh; Microscopic study on the Se-Te-Ge alloy and its composite with the carbon nano tubes and graphene, Journal of Advanced Microscopy Research,

	7(4), 270-276 (2012)
21	Vinod E. M, A.K. Singh, R. Ganesan, K. S. Sangunni; Effect of Selenium addition on the GeTe Phase Change Memory alloys, Journal of Alloys and Compounds, 537, 127- 132 (2012)
22	Abhay Kumar Singh; Surface Morphology and Crystallization Kinetics of Multicomponent Chalcogenide Glasses, Materials Focus 1(1), 50-56 (2012)
23	Abhay Kumar Singh; A recent advance in amorphous semiconductors- A correlative study on Sebased metallic chalcogenide alloys, Reviews in Advanced Sciences and Engineering, 1 (4), 292-300 (2012)
24	Abhay Kumar Singh; Recent advancement in metal containing multicomponent, Opto Electronics Review, 20 (3), 226- 238 (2012)
25	Abhay Kumar Singh; Amorphous and nano phase microstructures of bulk Se-based chalcogenide alloys, Optoelectronics Letters 8 (3) 165-167 (2012)
26	Abhay Kumar Singh; Comparative study on thermophysical properties of Se-Zn-In and Se-Zn Te-In chalcogenide, Advanced Science, Engineering and Medicine, 4 (2) 123-127 (2012)
27	Abhay Kumar Singh; A short over view on advantage of chalcogenide glassy alloys, Journal of Non - Oxide Glasses, 4 (1) 1-4 (2012)
28	Abhay Kumar Singh; Effect of indium additive on the heat capacity of Se-Zn chalcogenide glasses, The European Physical Journal Applied Physics, 55, 11103-4 (2011)
29	Abhay Kumar Singh; Effect of indium additive on heat capacities of Se- Zn-Te multicomponent chalcogenide glasses, Chalcogenide Letters, 8 (2) 127-132 (2011)
30	Abhay Kumar Singh, Kedar Singh; Localized structural Growths and Kinetics of $Se_{98-x}Zn_2In_x$ Amorphous Alloys, Physica Scripta 83 (2) 25605-6 (2011)
31	Abhay Kumar Singh, Kedar Singh; Observation of Meyer Neldel Rule and crystallization rate constant stability of $Se_{93-x}Zn_2Te_5In_x$ chalcogenide glasses, The European Physical Journal Applied Physics, 51 (3), 30301-5 (2010)
32	Abhay Kumar Singh, Neeraj Mehta, Kedar Singh; Study of dielectric properties of Se-Zn -In chalcogenide glasses, Journal of Optoelectronics and Advanced Materials, 12 (8), 1700-1705 (2010)
33	Abhay Kumar Singh, Neeraj Mehta, Kedar Singh; Effect of Indium additive on thermal stability of Se- Zn-Te chalcogenide, Philosophical Magazine Letters, 90 (3)

	201-208 (2010)
34	Abhay Kumar Singh, Neeraj Mehta, Kedar Singh; Correlation between Correlation between Meyer-Neldel Rule and Phase Separation in$Se_{98-x}Zn_2In_x$ Chalcogenide Glasses, Current Applied Physics 9 (4) 807-811 (2009)
35	Abhay Kumar Singh, Neeraj Mehta, Kedar Singh; Optical and FTIR properties of $Se_{93-x}Zn_2Te_5In_x$ chalcogenide Glasses, Physica B 404 (20), 3470-3474 (2009)
36	Abhay Kumar Singh, Neeraj Mehta, Kedar Singh; Electrical properties of Se- Zn –In chalcogenide glasses, The European Physical Journal Applied Physics 46 (2), 20303-4 (2009)
37	Abhay Kumar Singh, Kedar Singh; Composition dependence UVVisible and MID-FTIR properties of Se98- xZn2Inx (X= 0, 2, 4, 6 and 10) chalcogenide glasses, Journal of Modern Optics, 56 (4), 471-476 (2009)
38	Abhay Kumar Singh, Kedar Singh; Crystallization kinetics and thermal stability of $Se_{98-x}Zn_2In_x$ chalcogenide glasses, Philosophical Magazine, 89 (18), 1457- 1472 (2009)
39	Abhay Kumar Singh, Neeraj Mehta, Kedar Singh; Electrical properties of $Se_{93-X}Zn_2$-Te_5-In_x chalcogenide glasses, Chalcogenide Letters Letters, 6(1), 9-14 (2009)
40	Kedar Singh, Abhay Kumar Singh, N.S. Saxena; Temperature dependence of effective thermal conductivity and effective thermal diffusivity of $Se_{90}In_{10}$ bulk chalcogenide glass, Current Applied Physics, 8 (2), 159-162 (2008)
41	Abhay Kumar Singh, Kedar Singh, N.S.Saxena; Effect of annealing on structures and effective thermal conductivity of $Se_{90}In_{10}$ chalcogenide glass, Journal of Ovnic Research 4 (5), 107-111 (2008)
42	Abhay Kumar Singh, Kedar Singh; Correlative study of optical, electrical and thermal transport properties of $Se_{100-x}In_x$ chalcogenide glasses, Journal of Optoelectrics and Advanced Materials, 9 (12), 3756- 3759 (2007)
43	Abhay Kumar Singh, Pushpendra Kumar, Kedar Singh, N. S. Saxena: Thermal Transport In $Se_{81}Te_{15}Sb_4$ chalcogenide Glass, Chalcogenide Letters, 4 (1), 17-22 (2007)
Conference full papers	
44	Abhay Kumar Singh, Structural and Optical Characterizations of CIGST Solar Cell Materials, International Conference on Optics, Lasers and Spectroscopy, WASET Zurich, Switzerland-2013

45	Abhay Kumar Singh, K.S.Sngunni, Optical Parameters and FT-IR Characterization of CIGST Solar Cell Material, National Conference on "Advances in Lasers and Spectroscopy, IIT (ISM) Dhanbad-2012
46	Kedar Singh, M M A Imran, D Patidar, A K Singh, P Kumar,N S Saxena, Y K Vijay, Effect of lithium ion-irradiation on Se98In2 chalcogenide glass, 2nd National Conference on Condensed Matter & Material Physics, University of Jaipur-2006
Book Chapters	
47	Abhay Kumar Singh, Crystallization Science and Technology, INTECH International (2012)
48	Abhay Kumar Singh, Tien-Chien Jen, Introduction to nanomaterials and their applications in optoelectronics- In press, CRC Press, USA, ISBN: 9781771889407
Book	
49	Abhay Kumar Singh, Tien-Chien Jen, Chalcogenide: Carbon Nanotubes and Graphene Composites **CRC Press, ISBN 9780367203146**
50	Abhay Kumar Singh, Tien-Chien Jen, *2D Transition-Metal Dichalcogenides (TMDs) Fundamentals and Applications*, Cambridge Scholars Publishing (In process)
Article under process	
51	Kitalu Ricin Ngoy, Abhay Kumar Singh, Tien-Chien Jen, Numerical analysis of thin film Cu2InGaSe4 solar cells design (Submitted)
52	Kitalu Ricin Ngoy, Abhay Kumar Singh, Tien-Chien Jen, Impact of temperature on working performance and back contact metal work function of CIGS solar cell (Submitted).

Educational Qualifications

- Ph.D. Submitted-2009, awarded-2010 Banaras Hindu University Varanasi: Condense Matter Physics
- M.Sc. 2000 C.S.J.M.University Kanpur: Physics
- B.Sc 1998 C.S.J.M.University Kanpur: Physics, Chemistry, Math

- Intermediate 1994 U.P.Board PCM Group
- High School 1991 U.P.Board Science Group

Ph.D. Thesis Title "Preparation and investigation of Se-In based multi-component chalcogenide glasses"

Personal Information

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