


Brief Biodata

Name: Dr. Vidya Nand Singh

Designation:	Principal Scientist	
DP No. and Name:	5.01, In-house BND	
DU No. and Name:	5.00, Bhartiya Nirdeshaka Dravya	
Email:	singhvn@nplindia.org , vidyanands@gmail.com	
Date of Joining CSIR-NPL:	06-07-2011	
Phone (office)	01145608562	

Research Area/ Interest

Reference materials, electron microscopy, solar cell & photodetector, gas sensors, chalcogenides/oxides, thermoelectrics

Educational Qualifications

(Please write latest qualification first)

Degree	Subject	University/ Institute	Year
PhD	Solid-state materials/Physics	IIT Delhi	2005
M. Tech	Solid-state materials	IIT Delhi	1999
M. Sc	Solid-state Physics	BHU, Varanasi	1998
B.Sc	Physis, Mathematics	Purvanchal Univ, Jaunpur	1996

Academic / Research Experience

Grade / Post	Institute	Duration		Research Field
		From	To	
Principal Scientist	CSIR-NPL Delhi	06-07-2019	Till date	Reference materials, Electron microscopy,
Senior Scientist	CSIR-NPL Delhi	06-07-2015	05-07-2019	Gas sensing, solar cells, electron microscopy
Scientist	CSIR-NPL Delhi	06-07-2011	05-07-2015	Solar cells, PDs, Electron microscopy
Senior Project	IIT Delhi	05-06-2006	31-05-2011	Electron microscopy,

Scientist				nanomaterials
Project scientist	IIT Delhi	Dec 2005	June 2006	CVD growth, chemical synthesis
RA	IIT Delhi	Aug 2005	Nov 2005	nanocomposite
SRF	IIT Delhi	2002	2004	In ₂ O ₃ : Ag gas sensing

No. of Publications

No. of Publications in SCI Journals	No. of Publications in non-SCI Journals	No. of Publications in Conference Proceedings	Books	Total
220	10	3	3	236

Selected Publications

1. Faster response of NO₂ sensing in graphene–WO₃ nanocomposites
S Srivastava, K Jain, **VN Singh**, S Singh, N Vijayan, N Dilawar, G Gupta, TD Senguttuvan
Nanotechnology 23 (20), 205501, 2012
2. Enhanced gas sensing properties of In₂O₃: Ag composite nanoparticle layers; electronic interaction, size and surface induced effects
VN Singh, BR Mehta, RK Joshi, FE Kruis, SM Shivaprasad
Sensors and Actuators B: Chemical 125 (2), 482-488, 2007
3. Highly sensitive and pulse-like response toward ethanol of Nb doped TiO₂ nanorods based gas sensors,
S Singh, H Kaur, **VN Singh**, K Jain, TD Senguttuvan
Sensors and Actuators B: Chemical 171, 899-906, 2012
4. Physical principles of losses in thin film solar cells and efficiency enhancement methods
M Dhankhar, OP Singh, **VN Singh***
Renewable & Sustainable Energy Reviews 40, 214-223, 2014
5. Growth of CZTS thin films by co-sputtering from metal targets and sulfurization in H₂S
N Muhunthan, OP Singh, S Singh, **VN Singh***
International Journal of Photoenergy 2013, 752012, 2013
6. Controlled substitution of S by Se in reactively sputtered CZTS_{Se} thin films for solar cells
OP Singh, N Vijayan, KN Sood, BP Singh, **VN Singh***
Journal of Alloys and Compounds 648, 595-600, 2015
7. Fast switching response of Na-doped CZTS photodetector from visible to NIR range
OP Singh, A Sharma, KS Gour, S Husale, **VN Singh***
Solar Energy Materials and Solar Cells 157, 28-34, 2016
8. Enhanced photoresponse of Cu₂ZnSn(S, Se)₄ based photodetector in visible range
KS Gour, OP Singh, B Bhattacharya, R Parmar, S Husale, **VN Singh***
Journal of Alloys and Compounds 694, 119-123, 2017
9. Electrical Characterization of Grain Boundaries of CZTS thin films using Conductive Atomic Force Microscopy Techniques

- N Muhunthan, OP Singh, V Toutam, **VN Singh***
Materials Research Bulletin 70, 373–378, 2015
10. Tin Selenide as a Futuristic Material: Properties and Applications
M Kumar, S Rani, Y Singh, KS Gour, **VN Singh***
RSC Advances 11, 6477-6503, 2021
 11. Multiwalled HgX (X= S, Se, Te) Nanotubes Formed with a Mercury Iodide Catalyst in Nanocrystalline Thin Films Spray-Deposited at Low Temperature
AR Rao, V Dutta, **VN Singh**
Advanced Materials 20 (10), 1945-1951, 2008
 12. Photovoltaic response of a topotaxially formed CdS–Cu_xS single nanorod heterojunction
BR Mehta, S Gupta, **VN Singh**, P Tripathi, D Varandani
Nanotechnology 22 (13), 135701, 2011
 13. Highly responsive, low-bias operated SnSe₂ nanostructured thin film NIR photodetector
M Kumar, S Rani, A Pandey, KS Gour, S Husale, P Singh, **VN Singh***
Journal of Alloys and Compounds 838, 155384, 2020
 14. A review on properties, applications, and deposition techniques of antimony selenide
Mamta, Y Singh, KK Maurya, **VN Singh***
Solar Energy Materials and Solar Cells 230, 111223, 2021
 15. Sb₂Se₃ versus Sb₂S₃ solar cell: A numerical simulation
Mamta, KK Maurya, **VN Singh***
Solar Energy 228, 540-549, 2021
 16. Low bias operated, fast response SnSe thin-film Vis-NIR photodetector on glass substrate using one-step thermal evaporation technique
M Kumar, S Rani, P Vashishta, A Pandey, G Gupta, S Husale, **VN Singh***
Journal of Alloys and Compounds 879, 160370, 2021
 17. Strategy to improve the efficiency of tin selenide based solar cell: A path from 1.02 to 27.72%
M Kumar, S Rani, Mamta, Y Singh, A Kumar, **VN Singh***
Solar Energy 232, 146-153, 2022
 18. Exploring the possibility of using MWCNTs sheets as an electrode for flexible room temperature NO₂ detection
R Kumar, Mamta, BP Singh, **VN Singh***
Superlattices and Microstructures, 2022
 19. Rapidly Responding Room Temperature NO₂ gas Sensor based on SnSe Thin Film
S Rani, M Kumar, H Sheoran, R Singh, **VN Singh***
Materials Today Communications 30, 103135, 2022
 20. Temperature-Dependent n-p-n switching and Highly Selective Room Temperature SnSe/SnSe₂/SnO Heterostructure Thin Film based NO₂ Sensor
S Rani, M Kumar, P Garg, R Parmar, A Kumar, Y Kumar, V Baloria, U Deshpande, **VN Singh***
ACS Applied Materials & Interfaces, 2022
 21. Enhanced thermoelectric performance of n-type Zr_{0.66}Hf_{0.34}Ni_{1+x}Sn Heusler nanocomposites
A Kumar, S Bano, B Govind, A Bhardwaj, **VN Singh***
Journal of Alloys and Compounds 900, 163454, 2022
 22. Exploring the optoelectronic properties of SnSe: A new insight
M Kumar, S Rani, P Vashishta, G Gupta, X Wang, **VN Singh***
Journal of Materials Chemistry C 10 (44), 16714 – 16722, 2022
 23. n-Si/p-Sb₂Se₃ structure based simple solar cell device
Mamta, Y Singh, KK Maurya, **VN Singh***
Materials Today Sustainability 18, 100148, 2022
 24. Enhanced photoconductivity performance of microrod-based Sb₂Se₃ device

Y Singh, M Kumar, R Yadav, A Kumar, S Rani, Shashi, P Singh, S Husale, V. N. Singh*
Solar Energy Materials and Solar Cells 243, 111765, 2022

25. Sb₂Se₃/CZTS dual absorber layer based solar cell with 36.32 % efficiency: A numerical simulation
Mamta, KK Maurya, VN Singh*
Journal of Science: Advanced Materials and Devices 7 (2), 100445, 2022
26. Large area, self-powered, flexible, fast, and broadband photo-detector enabled by the SnSe-Sb₂Se₃ hetero-structure
M Kumar, S Rani, R Yadav, Y Singh, M Singh, S Husale, VN Singh*
Surfaces and Interfaces 30, 101964, 2022
27. Sb₂(S, Se)₃-based photovoltaic cell with MoS₂ as a hole transport layer: a numerical investigation
Mamta, R Kumar, R Kumari, KK Maurya, VN Singh
Materials Today Sustainability 20, 100218, 2022
28. Na Ion Batteries: An India Centric Review
Y Singh, R Parmar, Mamta, S Rani, M Kumar, VN Singh*
Heliyon 8 (8), e10013, 2022

Patents

Current Activities

(Not more than 100 words)

Synthesizing reference materials for instruments, growth of Sb₂Se₃, SnSe, SnSe₂, and oxide materials for optoelectronic, thermoelectric properties, solar cells (experiment and simulation, photodetector and gas sensing applications, electron microscopic studies of various materials

Honour(s)/Award(s)/ Fellowship(s)

Contributions to AcSIR

Associate professor

Teaching course, “Advanced Material Characterizations Techniques,” to AcSIR Ph.D. students about TEM, SEM, SIMS, PL, spectroscopy, etc.

Ph.D. Completed

1. Mr. N. Muhunthan, Registered in AcSIR, completed in Dec 2014, title of thesis: Deposition and Characterization of Cu₂ZnSnS₄ Thin Films for Solar Cell Applications),
2. Dr. Om Pal Singh (Registered/Completed: Jan 2012/ March 2017). Title of thesis: Effect of sodium on optical, structural, morphological and electronic properties of Cu₂ZnSn(S/Se)₄ thin films for electronic device applications
3. Dr. Kuldeep Singh Gour (registered/Completed: Jan 2015/ Nov 2019): Study of Electron Transport Properties of Cu₂ZnSnS₄ Based Absorber Materials for Optoelectronic Device Applications
4. Dr. Ashish Kumar completed 2022, (co-supervisor) (supervisor- Dr. Ritu Srivastava) Synthesis and Characterization of Organic-Inorganic Lead Halide and Lead-free Double Perovskite-based Materials for Energy Conversion
5. Mr. Ashish Jangra (SRF), registered/completed: August 2017/ Sept 2022): Development and characterizations of Heusler based thermoelectric materials for the enhanced figure of merit

Guiding students

1. Mr. Rahul Kumar (SRF): in progress (supervisor)
2. Mr. Manoj Kumar (SRF): in progress (supervisor)
3. Ms. Sanju Kumari (SRF): in progress (supervisor)
4. Mr. Yogesh Singh (SRF): in progress (supervisor)
5. Ms. Raman Kumari (SRF): in progress (supervisor)
6. Ms. Mamta (SRF): in progress (co-supervisor) (supervisor-Dr. K.K. Maurya)
7. Mr. Varun Kumar (registered at Amity, Noida), (co-supervisor), Supervisor; Dr Surbhi DAC members of nearly 25 students

Membership of Professional Societies/ Institutions

Life member of Electron microscopy society of India,
Life member of Carbon Society of India
Life member of Vijnan Bharati

Any other Information

(Not more than 100 words)

Editorial Board member of

1. Editor: Journal of Nanomaterials (Hindawi)
2. Edited a special section on functional nanomaterials for solar cells for Journal of Nanoscience and Nanotechnology 20 (6), 2020, 3620-3621
3. Edited books, (i) "Chemical Processing of Nanomaterials," Published by Taylor and Francis Group, (ii) Types of Photodetectors and their Applications, Published by Nova Science Publishers
4. **Advanced Science, Engineering and Medicine**
(http://aspbs.com/asem/editorial_asem.htm)
5. **Section Editor: Current Alternative Energy**
(<https://benthamsience.com/journals/current-alternative-energy/editorial-board/>)
6. Editorial member Science India Web Portal