CURRICULUM VITAE

Vandana Nagal, Ph.D.

Work:

Address : Centre for Nanoscience and Engineering (CeNSE)
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https://scholar.google.com/citations?user=JlHHDAMAAAAJ&hl=en

Personal Particulars:

Full name : Vandana Nagal

Date of Birth : 18 November, 1992

Gender : Female

Nationality : Indian

Martial Status : Unmarried

Details of Research Experience:

1. Position : **Ph.D. Research Scholar**, **(Dec.2017-Jan 2023)**

University : **Jamia Millia Islamia, New Delhi, India**

Department : Centre For Nanoscience and Nanotechnology

Research Supervisor : Dr. Aurangzeb Khurram Hafiz

Title of Thesis : **Investigation of Semiconductor nanostructures for optoelectronics and electrochemical sensor applications**

2. Position : **Project Scientist D, (Feb 2023- Feb 2024)**

University : **Indian Institute of Technology Delhi (IITD), New Delhi, India**

Department : Department of Physics

Research Supervisor : Dr. Bodhaditya Santra

Title of Project : **Portable and High Precision Compact Gravimeter for Field Applications**

3. Position : **Institute of Eminence Postdoctoral Fellow**, **(19 Feb 2024-Currently Working)**

University : **Indian Institute of Science (IISc), Bangalore, India**

Department : Centre for Nanoscience and Engineering (CeNSE)

Research Supervisor : Prof. Sushobhan Avasthi

Title of Project : **Advancing Solar Cell Efficiency and Stability Through Metal-Halide Perovskite and Heterojunction Development**

Academic Teaching Experience:

Two year of teaching experience as an ADHOC lecturer of Bachelor of Science for the subject of Physics in K.L. Mehta Dayanand College for Women, Faridabad, and Saraswati Mahila Mahavidyalaya, Palwal, Haryana.

Expertise in

- ✓ Fabrication of Stainless-steel and bifacial perovskite solar cells
- ✓ Organic and inorganic metal halide perovskite nanocrystals solution processed synthesis and characterization
- ✓ Thin-film deposition
- ✓ Different nanomaterials synthesis, and their characterizations
- ✓ Hot carriers kinetic study of halide perovskite nanocrystals *via* Ultrafast Transient Absorption Spectroscopy
- ✓ Optical sensor, and electrochemical sensor fabrication and development of nanomaterial for electrochemical biosensors measurement
- ✓ Electronic PCB Designing, Construction of Current Controller, Construction of Temperature Controller, Compact Diode Laser System Making

Technical Skills

- **Nanomaterial Synthesis:** Synthesis of nanomaterial by wet-chemical route, solid state synthesis. Advanced Nanomaterial Engineering (ZnO, TiO_2, Co_3O_4, SnO_2, Fe_2O_3, CuO, NiO_x, g-C_3N_4, GO)
- Use of glove box, high temperature furnace, spin coating, sputtering, Plasma enhanced chemical vapour deposition (PECVD), Physical vapor deposition (PVD) for thin film.
- **Analytical Techniques:**

(a) **Spectroscopy :** UV-Vis, Photoluminescence , Raman, DLS, FTIR, XPS, Ultrafast Transient Absorption

(b) **Microscopy :** SEM, TEM, AFM.

(c) **Other techniques** : XRD, PLQY measurement, I-V measurement for photo-detector and solar cell, electrochemical station.

- **Software application tools:** Experienced with working with the relevant software, Image J, Origin, XPS PEAK, Match, Avogadro, VESTA, LTSpice – For circuit simulation, Altium – PCB designing, AutoCAD – Mechanical Design
- **Utilities:** Microsoft Office, Microsoft Excel, Microsoft PowerPoint, Adobe Photoshop, Adobe Illustrator, ChemDraw.

Education:

Exam.	Discipline	Board/university	Year	Division
10th	Science	Haryana Board	2007	1st
12th	Science	Haryana Board	2009	1st
Bachelor of Science	Physics	M.D.U. Rohtak University, India	2012	1st
Master of Science	Physics	Kurukshetra University, India	2014	1st
Bachelor of Education	Science	M.D.U. Rohtak University, India	2015	1st
Ph.D.	Nanoscience	Jamia Millia Islamia, India	2023	1st

Honors/Awards:

- **ANRF International Travel Grant** for ICCMME 2025, South Korea
- **UGC Travel Grant** for MCARE 2022 conference work presentation
- Qualified **CSIR-NET** (National Eligibility Test) Physical Science June 2018
- Qualified **GATE** (Graduate Aptitude Test of Engineering) February 2017
- Qualified **UPTET** (Uttar Pardesh Teacher Eligibility Test) 2017
- Qualified **CTET** (Central Teacher Eligibility Test) September 2015
- Awarded **POSE** Scholarship (Promotion of Science Education) By Haryana Science and Technology Department during Master of Science (2012-2014)
- Got 2nd position in Bachelor of Science in 5th semester Dec. 2011
- 1st Topper in Bachelor of Science in 4th Semester in M.D.U. June 2011

Training and Certificates:

- Attended seven days instrumentation training program entitled “Synergistic Training Program Utilizing the Scientific and Technological Infrastructure **(STUTI)”** organized by Amity University, Uttar Pradesh, 24th May -30th May 2022, sponsored by Department of Science and Technology (DST), India.

- Attended Basic training program i.e., Indian Nanoelectronics User Program **(INUP)** Workshop organized by CeNSE, IISC Bangalore supported by MHRD, New Delhi, India for 14 May -16 May 2019.
- Attended a workshop cum short term course on Organic Photovoltaics and Electronics Technology 2018 **(OPET 2018)** during 6 August -10 August 2018 at CSIR-NPL, New Delhi. During workshop Organic Solar Cell Device and Perovskite Solar Cell Device has been fabricated using Glove Box.
- Attended International School on **Ion Beam in Energy Materials** during 12 July-18 July 2018 at IUAC, New Delhi.
- Attended National Workshop on **Ion Beam Induced Growth and Engineering of Materials** 2014, Kurukshetra University, Kurukshetra.

Ph.D. Course Work:

- ✓ Research Methodology
- ✓ Characterization Techniques
- ✓ Thin Film Photovoltaics
- ✓ Bibliography Seminar

PUBLICATIONS:

- **Bibliometry: 21 Publications**: 19 Journal Papers, 2 conference publications; 2 Book Chapters; 11 conference abstracts.

Indian Patent (Filed): (01)

1. **Patent entitled:** Vertically Oriented Zinc Oxide Nanorods-Based Electrolyte-Gated Transistor Field-Effect Transistor for High-Performance Glucose Sensing
   Inventors: Rafiq Ahmad, Marya Khan, **Vandana Nagal,** Sakeena Masrat, Kiesar Sideeq Bhat, Iram Wahid
   Filed on dated 07/07/2022, Patent Application No.: 202211039175.

Published Articles in Journals (19):

1. **Vandana Nagal**, Virendra Kumar, Rahul Kumar, Kedar Singh, Ajit Khosla, Rafiq Ahmad, and A.K. Hafiz, "$CsPbBr_3$ Nanoplatelets: Synthesis and Understanding of Ultraviolet Light-Induced Structural Phase Change and Luminescence Degradation" *ECS Journal of Solid State Science and Technology (IOP Publishing)*, Vol. **10**, pp. 096002, 2021. **(IF: 2.483) Q2**
   https://doi.org/10.1149/2162-8777/ac2078

2. Virendra Kumar, **Vandana Nagal**, Rahul Kumar, Shubhda Srivastava, Bipin Kumar Gupta, Mahesh Kumar, Aurangzeb Khurram Hafiz, and Kedar Singh. "Influence of the Rate of Radiation Energy on the Charge-Carrier Kinetics Application of All-Inorganic $CsPbBr_3$ Perovskite Nanocrystals" *RSC Advances (RSC),* Vol. **10(57)**, pp. 34651-34657, 2020. **(IF: 4.036) Q1** DOI: 10.1039/D0RA05766E
3. Virendra Kumar, **Vandana Nagal**, Shubhda Srivastava, Mahesh Kumar, Bipin K. Gupta, Aurangzeb K. Hafiz, and Kedar Singh. "Power Dependent Hot Carrier Cooling Dynamics in Trioctylphosphine Capped $CsPbBr_3$ Perovskite Quantum Dots Using Ultrafast Spectroscopy" *ChemistrySelect (Wiley Publishing),* Vol. **6(38)**, pp. 10165-10177, 2021.**ISSN NO. 23656549 (IF: 2.307) Q2** https://doi.org/10.1002/slct.202102450
4. Sultan Ahmad, Hasan Abbas, Mohd Bilal Khan, **Vandana Nagal**, A. K. Hafiz, and Zishan H. Khan. "ZnO for Stable and Efficient Perovskite Bulk Heterojunction Solar Cell Fabricated Under Ambient Atmosphere" *Solar Energy (Elsevier Publishing),* Vol. **216**, pp. 164-170, 2021. **(IF: 7.188) Q1** https://doi.org/10.1016/j.solener.2021.01.015
5. **Vandana Nagal**, Virendra Kumar, Rafiq Ahmad, Marya Khan, Zishan H Khan, Kedar Singh, Hidemitsu Furukawa, Ajit Khosla, Yoon Bong Hahn, and A.K. Hafiz, "Review—Emerging Applications of g-C_3N_4 Films in Perovskite-Based Solar Cells" *ECS Journal of Solid State Science and Technology (IOP Publishing)*, Vol. **10**, pp. 065001, 2021. **(IF: 2.483) Q2** https://doi.org/10.1149/2162-8777/ac040b
6. Marya Khan, **Vandana Nagal**, Sakeena Masrat, Talia Tuba, Shamshad Alam, Kiesar Sideeq Bhat, Iram Wahid, Rafiq Ahmad*, **"**Vertically Oriented Zinc Oxide Nanorod-Based Electrolyte-Gated Field-Effect Transistor for High-Performance Glucose Sensing**"** *Analytical Chemistry (ACS)*, Vol. **94(25)**, pp. 8867-8873, 2022. **(IF: 8.008) Q1**
   ***Highlighted as Cover image of the journal** https://doi.org/10.1021/acs.analchem.1c05630
7. **Vandana Nagal**, Talia Tuba, Virendra Kumar, Shamshad Alam, Akil Ahmad, Aurangzeb Khurram Hafiz, Mohammed Alshammari, and Rafiq Ahmad*, **"**A Non-Enzymatic Electrochemical Sensor Composed of Nano-Berries Shaped Cobalt Oxide Nanostructures on Glassy Carbon Electrode for Uric Acid Detection**"** *New Journal of Chemistry (RSC)*, Vol. **46**, pp. 12333-12341, 2022. **(IF: 3.925) Q1** https://doi.org/10.1039/D2NJ01961B
8. Marya Khan, **Vandana Nagal**, Umesh Tukaram Nakate, Mohammad Rizwan Khan, Ajit Khosla, and Rafiq Ahmad*, "Engineered CuO Nanofibers with Boosted Non-Enzymatic Glucose Sensing Performance" *Journal of The Electrochemical Society (IOP Publishing),* Vol. **168**, pp. 067507, 2021. **(IF: 4.386) Q1** https://doi.org/10.1149/1945-7111/ac030d
9. Marya Khan[#]**, Vandana Nagal[#],** Sakeena Masrat, Talia Tuba, Nirmalya Tripathy, Mohammad K. Parvez, Mohammed S. Al-Dosari, Ajit Khosla, Hidemitsu Furukawa, A.K. Hafiz, and Rafiq Ahmad "Wide-Linear Range Cholesterol Detection Using Fe_2O_3 Nanoparticles Decorated ZnO Nanorods Based Electrolyte-Gated Transistor" *Journal of The Electrochemical Society (IOP Publishing),* Vol. **169**, pp. 027512, 2022. **(IF: 4.386) Q1** *[#] Equal contribution*
   https://doi.org/10.1149/1945-7111/ac51f6

10. **Vandana Nagal**, Virendra Kumar, Marya Khan, Suliman Alomar, Nirmalya Tripathy, Kedar Singh, Ajit Khosla, Naushad Ahmad, A.K. Hafiz, and Rafiq Ahmad "A Highly Sensitive Uric Acid Biosensor Based on Vertically Arranged ZnO Nanorods on ZnO Nanoparticles Seeded Electrode" ***New Journal of Chemistry (RSC)*****,** Vol. **45**, pp. 18863-18870, 2021. **(IF: 3.925) Q1** https://doi.org/10.1039/D1NJ03744G
11. Rayees Ahmed Zargar, MM Hassan, Kundan Kumar, **Vandana Nagal,** Abida Bashir, Badriah Alshahrani, Thamraa Alshahrani, Mohd Shkir, "Development and characterization of (ZnO) 0.90 (CNT) 0.10 thick film for photovoltaic application" ***Optik (Elsevier Publishing),*** Vol. **248**, pp. 167975, 2021. **ISSN 1618-1336 (IF: 2.84) Q1** https://doi.org/10.1016/j.ijleo.2021.167975
12. Sakeena Masrat, **Vandana Nagal**, Marya Khan, Iqra Moid, Shamshad Alam, Kiesar Sideeq Bhat, Ajit Khosla and Rafiq Ahmad, "Electrochemical Ultrasensitive Sensing of Uric Acid on Non-Enzymatic Porous Cobalt Oxide Nanosheets-Based Sensor" ***Biosensors (MDPI),*** **12**, pp. 1140, 2022. **(IF: 5.743)** https://doi.org/10.3390/bios12121140
13. Virendra Kumar, Harish Chauhan, **Vandana Nagal**, A.K. Hafiz, and Kedar Singh, "Lattice-Distortion-Induced Change is Magnetic Properties in Br-Defect Host $CsPbBr_3$ Perovskite Quantum Dots", **Journal of Physical Chemistry Letters**,**14**, pp.888-896, **2023**. **(IF: 6.88) Q1 https://doi.org/10.1021/acs.jpclett.2c03576**
14. **Vandana Nagal**, Marya Khan, Sakeena Masrat, Shamshad Alam, Akil Ahmad, Mohammed Alshammari, Kiesar Sideeq Bhat, and Rafiq Ahmad, "Hexagonal Cobalt Oxide Nanosheets Based Enzymeless Electrochemical Uric Acid Sensor with Improved Sensitivity, **47, 4206-4212** New Journal of Chemistry (RSC**) 2023. (IF:3.925) Q1** https://doi.org/10.1039/D2NJ06331J
15. **Vandana Nagal**, Sakeena Masrat, Marya Khan, Shamshad Alam, Kiesar Sideeq Bhat, Ajit Khosla, and Rafiq Ahmad, "Highly Sensitive Electrochemical Uric Acid Sensor Based on Puffy Balls Shaped Cobalt Oxide Nanostructures", **Biosensors**,**13(3)**, pp.375, **2023**. **(IF:5.743) Q1** https://doi.org/10.3390/bios13030375
16. **Vandana Nagal**, Virendra Kumar, Shafaque Rahman, Kapil Kumar, Kedar Singh, Mahesh Kumar, Rafiq Ahmad, and A.K. Hafiz, "Insight into Hot Carrier Kinetics of CsPbBr3/ZnO Heterostructures for Photodetector Application**",** **ACS Applied Optical Materials**,**1**, pp.779-787, **2023**. **Q1** https://doi.org/10.1021/acsaom.2c00201
17. **Vandana Nagal**, Virendra Kumar, Manjari Jain, Saurabh Saini, Mahesh Kumar, Kedar Singh, Saswata Bhatacharya, Rafiq Ahmad, and A.K. Hafiz, "Slow Cooling and Transfer Dynamics of Hot Excitons in CsPbBr3 Perovskite Quantum Dots/g-CN Nanosheet Heterostructures: Implications for Optoelectronic Applications**",** **ACS Applied Nano Materials**,**1**, **2023**. **(IF:6.140) Q1** https://doi.org/10.1021/acsanm.3c01374
18. Zargar, R. A., M. Imran, M. Arora, **V. Nagal,** Tuiba Mearaj, M. Aslam Manthrammel, Mohd Shkir, and A. K. Hafiz. "Low-cost synthesis of lanthanides (Eu3+ and Sm3+)-intercalated TiO2 nanostructures: a detailed study on structural, optical and photocatalytic applications." Journal of Materials Science: Materials in Electronics 33, 2022: 26931-26942. https://doi.org/10.1007/s10854-022-09357-5

19. **Vandana Nagal,** Sakeena Masrat, Marya Khan, Shamshad Alam, Akil Ahmad, Mohammed Alshammari, Shamshad Alam, Kiesar Sideeq Bhat, and Rafiq Ahmad, "Boosted Electrochemical Sensing of Uric Acid with Zinc Oxide Nanorods and Copper Oxide Nanoseeds Based Hybrid Nanostructures", **ACS Applied Nano Materials**, ACS Appl. Nano Mater. 2023, 6, 18, 16615–16624

Manuscript Under Preparation: Communicated/Revision file submitted

1. Virendra Kumar, **Vandana Nagal**, Harish Chauhan, A.K. Hafiz, and Kedar Singh, "Enhanced Superparamagnetism Response in Solution-Synthesized $CsPbBr_3$ Perovskite Quantum Dot/Reduced Graphene Oxide Composite", **Communicated**

Published in Conference Proceedings

1. **Vandana Nagal,** Mohammad Salman Khan, Virendra Kumar, Navjyoti Boora, Zishan H Khan, Kedar Singh, Aurangzeb Khurram Hafiz, "Optical Study of ZnO Nanorods Grown via Vapour Solid Growth Method for Energy Harvesting Applications'', *AIP Conference Proceedings* **2276**, 020022 (2020) https://doi.org/10.1063/5.0025737
2. Navjyoti Boora, Poonam Rani, **Vandana Nagal,** Shafaque Rahman, VPS Awana, AK Hafiz, "Synthesis, Characterization of LCMO Composite and Fabrication of Its Thin Films by R.F Magnetron Sputtering for Room Temperature Applications', *AIP Conference Proceedings* **2276**, 020047 (2020) https://doi.org/10.1063/5.0025716

Book Chapters

1. **Vandana Nagal,** Virendra Kumar, Marya Khan, Kedar Singh, Aurangzeb Khurram Hafiz, Mohammed Nazim, Rafiq Ahmad, "**Metal halide perovskite nanomaterials for battery applications"**, *Advances in Electronic Materials for Clean Energy Conversion and Storage Applications*, 1, Elsevier, ISBN: 978-0-323-91206-8, Woodhead Publishing Series in Electronic and Optical Materials 2023, Pages 537-568

   https://doi.org/10.1016/B978-0-323-91206-8.00024-8
2. Virendra Kumar, **Vandana Nagal,** Ajit Kumar, Ashwani Kumar Singh, Aurangzeb Khurram Hafiz, Smart Nanomaterials and Sensing Devices: An Introduction, Springer Nature Book–Smart Nanostructure Materials and Sensor Technology, ISBN 978-981-19-2684-6, ISBN 978-981-19-2685-3 (eBook), 2022, 1-22, https://doi.org/10.1007/978-981-19-2685-3

CONFERENCES

1. **Vandana Nagal**, Varun Adiga, Sushobhan Avasthi, 10th International Conference on Composite Materials and Material Engineering (ICCMME 2025), Yonsei University, 8-10 January 2025, Seoul, South Korea, "Revolutionizing Photovoltaics: Flexible and Opaque Stainless-Steel Based Perovskite Solar Cells"

2. **Vandana Nagal**, Sushobhan Avasthi, International Conference on Advances in Sustainable Solutions for Energy Transitions (ASSET 2025) IIT Guwahati, 2-4 January 2025, "Next-Generation Photovoltaics: Transparent Top Electrodes and Buffer Layer in Bifacial Perovskite Solar Cells"

3. Marya Khan, **Vandana Nagal,** Nargis Fatima Khatoon, Talia Tuba, Rafiq Ahmad*, "Vertically Oriented Zinc Oxide Nanorods Based Electrolyte-Gated Field-Effect-Transistor for High-Performance Glucose Sensing" SPAST Abstract,1(01), First International Conference on Technologies for Smart Green Connected Society (ICTSGS), 29-30 November 2021, Online, worldwide.

4. **Vandana Nagal**, Virendra Kumar, Iqra Moid, Sakeena Masrat, Aurangzeb Khurram Hafiz, Rafiq Ahmad, "Fabrication of nano-berries shaped cobalt oxide nanostructures based uric acid sensor", International Conference on Nanotechnology: Opportunities and Challenges November 28-30, 2022 (ICNOC 2022) organized by Jamia Millia Islamia, India.

5. Virendra Kumar, **Vandana Nagal**, A.K. Hafiz, and Kedar Singh, "Power Dependent Hot Carrier Cooling Dynamics in Trioctylphosphine Capped $CsPbBr_3$ Perovskite Quantum Dots Using Ultrafast Spectroscopy", International Conference on Nanotechnology: Opportunities and Challenges November 28-30, 2022 (ICNOC 2022) organized by Jamia Millia Islamia, India.

6. **Vandana Nagal**, Iqra Moid, Virendra Kumar, Sakeena Masrat, Aurangzeb Khurram Hafiz, Rafiq Ahmad, "Fabrication of nano-berries shaped cobalt oxide nanostructures based uric acid sensor", International Conference on Nanotechnology: Opportunities and Challenges November 28-30, 2022 (ICNOC 2022) organized by Jamia Millia Islamia, India.

7. Sayra Bano, Marya Khan, Iqra Moid, **Vandana Nagal,** Sakeena Masrat, Rafiq Ahmad*, "Co_3O_4 Hexagonal Nanodisks Synthesis for Ethanol Gas Sensing Application", International Conference on Nanotechnology: Opportunities and Challenges November 28-30, 2022 (ICNOC 2022) organized by Jamia Millia Islamia, India.

8. Marya Khan, **Vandana Nagal,** Sakeena Masrat, Talia Tuba, A.K. Hafiz, Rafiq Ahmad*, "Fabrication of Fe_2O_3 Nanoparticles Decorated ZnO Nanorods based Electrolyte-Gated Transistor for Cholesterol Sensing" 2022 International Conference on Advances in Chemical Sciences & Nanocomposites (ACSN-2022), 1-03 April 2022, Zakir Husain Delhi College, University of Delhi, India. (**Won best poster award**)

9. **Vandana Nagal**, Poster Presentation entitled "Air-Solution Processed Absorber Layer based

Perovskite/ZnO-gCN Composite for Perovskite Solar Cells Application" in International Conference ICTN-KLC 2021 organized by IIT- Delhi, New Delhi during 24 August -26 August 2021.

10. **Vandana Nagal**, Poster Presentation entitled "Ultra - Violet Light Illumination Treatment on All Inorganic colloidal CsPbBr3 Nanowires" in International Conference ASMET 2020 organized by IGDTUW, New Delhi for 23 January -24 January 2020
11. **Vandana Nagal**, Oral Presentation in National Conference named "Nano-Polysaccharides for Environmental Sustainability" dated on Sep 25, 2019, Organized by Department of Chemistry, JMI, New Delhi.
12. **Vandana Nagal**, Oral Presentation entitled "Role of Nanoscience and Nanotechnology in Photovoltaic Applications" in National Conference on Role of Meghnad Saha in Growth of Physics (RMSGP 2019) organized by J.C. Bose University (YMCA), Faridabad, Haryana 26 July 2019.
13. **Vandana Nagal**, Paper presented entitled "Optical Study of ZnO Nanorods Grown *Via* Vapour Solid Growth Method for Energy Harvesting Applications" in International Conference ICAM 2019 organized by CNN, Jamia Millia Islamia, New Delhi during 6-7 March 2019.

REFERENCES

1. Dr. Aurangzeb Khurram Hafiz, Professor, Centre for Nanoscience and Nanotechnology, Jamia Millia Islamia, Central University, Jamia Nagar, New Delhi, Delhi 110025, India. E-mail: ahafiz@jmi.ac.in
2. Dr. Rafiq Ahmad, Associate Research Professor, New-senior' Oriented Smart Health Care Education Center, Pukyong National University, Busan-48513, South Korea. Phone: +82-10-2973-2053 E-mail: rahmad5@jmi.ac.in
3. Dr. Bodhaditya Santra, Assistant Professor, Department of Physics, Indian Institute of Technology Delhi (IITD), New Delhi, Delhi 110025, India. E-mail: bodhaditya.santra@physics.iitd.ac.in

Place: Bengaluru, India **Date:** 01/02/2025