




Title	Prof.	First Name	Arijit	Last Name	Chowdhuri	Photograph
Designation	Professor in Physics					
Address	Department of Physics, Acharya Narendra Dev College (University of Delhi), Govindpuri, Kalkaji, New Delhi – 110 019 INDIA					
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Residence						
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Email/ Web-Page	arijitchowdhuri@andc.du.ac.in , arijitc123@gmail.com <a href="http://andcollege.du.ac.in/?q=departments/physics/faculty%208">http://andcollege.du.ac.in/?q=departments/physics/faculty%208</a>					
Educational Qualifications						
Degree	Institution				Year	
Post - Doctoral studies	Department of Electronic Materials Engineering, Research School of Physics and Engineering, The Australian National University, ACT – 0200, Canberra, Australia				2009	
Ph.D. (Experimental Material Science)	Department of Physics & Astrophysics, University of Delhi				2003	
M.Sc. Physics (Electronics)	Hindu College, University of Delhi				1997	
B.Sc. (H) Physics	Shivaji College, University of Delhi				1995	
Career Profile						
<p>Dr. Arijit Chowdhuri is Professor in the Department of Physics at Acharya Narendra Dev College, University of Delhi. He has a Ph.D. in experimental semiconducting thin film based sensors and has postdoctoral work experience in Australian National University, Canberra, Australia. He has research collaboration with Jozef Stefan Institute (JSI), Ljubljana, SLOVENIA and Norwegian Institute of Air Research (NILU), Kjeller, NORWAY. He has 98 scientific research publications/papers with 42 presentations in International conferences. He has research interests in Electronic Nose for artificial olfaction, Integrated semiconductor gas/chemical sensors, Quartz Crystal Microbalance sensors, Surface Plasmon Resonance based gas/biosensing, Ambient air pollution detection and mitigation, water purification, Thin film deposition of electronic materials - RF Sputtering, E-Beam evaporation, Pulsed LASER Deposition, Atomic Layer Deposition. So far as PI/Co-PI he has completed 10 research projects with an aggregate funding of Rs. 2.19 crores from agencies including Department of Science &amp; Technology, University of Delhi and Department of Information Technology (now DeitY) out of</p>						

which one has been a bilateral with Slovenia. Within a teaching career span of 16 years he has 05 publications/articles/presentations in field of education besides contribution of 03 e-chapters for virtual learning portal of University of Delhi. He is recognized for independent Ph.D. guidance by University of Delhi since November 2019 and has a student currently registered under his guidance. He is Scientific Chair at 6<sup>th</sup> Int'l Conf. on Education 2020 (ICEDU - 2020) at Bangkok, Thailand and has been Session Chair for two tracks at the 5<sup>th</sup> Int'l Conf. on Education 2019 (ICEDU – 2019) at Kuala Lumpur, Malaysia. He has been winner of Best Innovative Idea award for DU Innovation project in 2015 and recognized for Teaching Excellence and Innovation by University of Delhi.

#### Administrative Assignments

- Member, Internal College Complaints committee (July 2019 – till date)
- Member, Paritantra, Environment Club (July 2018 – 2020)
- Convener, Innovation Conclave – 2016, 25 – 26 October 2016
- Convener, Finance committee (April 2014 – September 2019)
- Member, Finance Committee (January 2010 – March 2014, October 2019 – 2020)
- Convener, Fellowship Committee (April 2016 – July 2018)
- Convener, Professional Development Committee (April 2016 – July 2018)
- Teacher-in-charge, Physical Science (Electronics) (April 2014 – March 2016)
- Teacher-in-charge, Department of Physics (October 2006 – March 2008)
- Member, Alumni committee (April 2014 – March 2016)
- Convener, Editorial Committee (2010 – 2012)
- Member, Admission committee (Dept. of Physics) and IT Committee
- Convener of the NGPE examination at AND College (2004 – 2006) for undergraduate Physics students
- Member college purchase committee (2006 – 2008): IT and Physics Department
- Member of garden committee (2007 – 2009)
- Actively involved in installation of the University supplied Instruments and redesigning of existing laboratory
- Convener IT committee (2006 – 2008); conceptualized and designed the college's new dynamic website and initiated the process of online admission

#### Areas of Interest / Specialization

- Digital Electronics
- Experimental Material Science (Nanotechnology, RF Sputtering, ALD, PLD)
- Artificial Olfaction & Electronic Nose – Gas Sensing
- Quartz Crystal Microbalance (QCM)
- Environment monitoring and exposure assessment
- Developing portable autonomous sensor prototypes

#### Subjects Taught

- Digital Systems & Applications
- Analog Systems & Applications
- Physics of Materials

- Electronic Instrumentation
- Network Analysis

#### Research Guidance and related visits

Recognized for independent Ph.D. guidance by University of Delhi since November 2019. Currently, four students are registered under my supervision for their doctoral thesis work. They are Mr. Ajay Sao, Mr. Jatinder Pal Singh, Mr. Shiva Lamichane and Mr. Rohit Miglani

**Norway** To deliver an Invited Talk at Norwegian Institute of Air Research (NILU), Lillestroem, Norway on 27 October 2017. Topic - "Particulate Matter (PM) concentration level monitoring and exposure assessment"

**Hungary** Presented paper at ICOEST 2017 Conference, Budapest 19 – 23 October 2017

**Slovenia** (i) Research visit under bilateral project from 03 - 12 May 2017. Presented papers at (ii) ISEB 2015 conference September 2015 Piran-Portoroz and (iii) OCWC Global 2014 conference April 2014, Ljubljana

**USA** Presented papers in the following conferences (i) SPIE-DSS 2011; Orlando FL, (ii) IEEE Sensors 2002; Orlando FL, (iii) Nano-2002; Orlando FL, and (iv) IMCS – 9 (2002), Boston MA

**Australia** Visiting Fellow at Dept. of Electronic Materials Engineering, Research School of Physical Sciences, The Australian National University, Canberra, 2009

**New Zealand** Presented papers in IEEE Sensors 2009 conference, October 2009 at Christchurch

**Canada** Presented a paper at IEEE Sensors 2003 conference, October 2003 at Toronto

**Malaysia** Presented a paper and Chaired a Session at International Conference on Education (ICEDU) 2019, Kuala Lumpur held from 5 – 7 April 2019

#### Publications Profile

##### Papers in International Refereed Journals

1. "Room temperature SO<sub>2</sub> and H<sub>2</sub> gas sensing using hydrothermally grown GO-ZnO nanorod composite films" - Vishal Dhingra, Shani Kumar, Ravi Kumar, Amit Garg and Arijit Chowdhuri, J. of Material Research Express, Vol. 7 (2020) 065012 IOP Publishing [ISSN: 2053 – 1591] [DOI: 10.1088/2053-1591/ab9ae7]
2. "Sonication Effect on Graphene Oxide (GO) Membranes for Water Purification Applications" - Shani Kumar, Amit Garg and Arijit Chowdhuri, J. of Material Research

Express Vol. 6 (2019) 085620 IOP Publishing [ISSN: 2053 – 1591] [DOI: 10.1088/2053-1591/ab1ffd]

3. "A Novel Method of Electrochemically Growing ZnO Nanorods on Graphene Oxide as Substrate for Gas Sensing Applications" - Chetna, Shani Kumar, Amit Garg, Arijit Chowdhuri, Amit Jain, and Avinashi Kapoor, J. of Material Research Express Vol. 6, (2019) 075039 IOP Publishing [ISSN: 2053 – 1591] [DOI: 10.1088/2053-1591/ab16f8]
4. "Comparison of water purification properties of Graphene Oxide (GO) Membranes with tuned interlayer spacings" - Shani Kumar, Amit Garg and Arijit Chowdhuri, J. of Material Research Express Vol. 6, (2019) 015604 IOP Publishing [ISSN: 2053 – 1591] [DOI: 10.1088/2053-1591/aae416]
5. "Structural and Optical Properties of Electrochemically Deposited ZnO Nanorods by Using Graphene Oxide and ITO as Substrate Material: A Comparative Study" – Chetna, Shani Kumar, Amit Garg, Arijit Chowdhuri, Amit Jain, and Avinashi Kapoor, J. of Material Research Express Vol. 5, No. 9 (2018) 095024 IOP Publishing [ISSN: 2053 – 1591] [DOI: 10.1088/2053-1591/aad7a5]
6. "Virtual Learning Environment (VLE)- A platform to enhance quality education"- Charu K. Gupta and Arijit Chowdhuri, **International Journal on Education Growth and Research** Vol. II (I) 2017
7. "Assessment of particulate matter (PM) concentrations at a typical construction site in Bangalore, India" – Arijit Chowdhuri and Charu K. Gupta - **International Research Journal of Environmental Sciences** Vol. 6(2), pp 1 - 5, February (2017) [ISSN: 2319 – 1414]
8. "Diminishing public health due to Particulate Matter in the ambient" – Charu K. Gupta and Arijit Chowdhuri – **International Journal of Engineering Research and Allied Sciences (IJERAS)** Vol. 1, Issue 9 November 2016 pp 1 – 5 [ISSN: 2455 - 9660]
9. "A novel OER initiative under University of Delhi's new Four Year Undergraduate Programme: an investigation into the Pedagogical Impact" (April 2014) – Arijit Chowdhuri and Charu Khosla Gupta - Video Journal of Open Education Abstracts Volume 1([http://videlectures.net/arjit\\_chowdhuri/](http://videlectures.net/arjit_chowdhuri/))
10. "Low cost 'Smart' switch for designing Electronic Nose (E-Nose) for gas sensing applications" - Nikhil Kumar, Saptarshi Chakrabarty, Shobha Badola, Sunita Narang, Charu K. Gupta and Arijit Chowdhuri, Journal of **Advanced Research in Electrical and Electronic Engineering (AREEE)** 1 (1) (2014) pp 35 – 37 [Print ISSN: 2349-5804 Online ISSN: 2349-5812]
11. "Using mobile phones with android OS for measuring hazardous gas concentrations

detected using Electronic Nose (E-Nose)" - Prayas Tiwari, Ashish Pokhriyal, Pankaj Rawat, Charu K. Gupta, Sunita Narang and Arijit Chowdhuri, Journal of **Advanced Research in Electrical and Electronic Engineering (AREEE)** 1 (1) (2014) pp 25 – 27 [Print ISSN: 2349-5804 Online ISSN: 2349-5812]

12. "Enhanced room temperature response of SnO<sub>2</sub> thin film sensor loaded with Pt catalyst clusters under UV radiation for LPG", Divya Haridas, Arijit Chowdhuri, K. Sreenivas and Vinay Gupta, **Sensors & Actuators B**, 153 (2011) 152 - 157
13. "Effect of thickness of Platinum catalyst clusters on response of SnO<sub>2</sub> thin film sensor for LPG", Divya Haridas, Arijit Chowdhuri, K. Sreenivas and Vinay Gupta, **Sensors & Actuators B**, 153 (2011) 89 – 95
14. "Comparison of H<sub>2</sub>S sensing response of hetero-structure sensor (CuO - SnO<sub>2</sub>) prepared by rf sputtering and Pulsed Laser Deposition", Manish Verma, Arijit Chowdhuri, K. Sreenivas and Vinay Gupta, **Thin Solid Films** 518 (2010) 181-82.
15. "Contribution of adsorbed oxygen and interfacial space charge for enhanced response SnO<sub>2</sub> sensors having CuO catalysts for H<sub>2</sub>S gas", Arijit Chowdhuri, Sushil K. Singh, Sreenivas and Vinay Gupta, **Sens. Actuators B** 145 (2010) 155-66.
16. "Mechanism of trace level H<sub>2</sub>S gas sensing using Rf sputtered SnO<sub>2</sub> thin films with CuO catalytic overlayer, Arijit Chowdhuri, Divya Haridas, K. Sreenivas and Vinay Gupta, **Intl Smart Sensing & Intelligent Syst.**, 2 (2009) 540-08 (ISSN 1178-5608)
17. "Enhanced LPG response characteristics of SnO<sub>2</sub> thin film based sensors loaded with Pt clusters", Divya Haridas, Arijit Chowdhuri, K. Sreenivas and Vinay Gupta, **Intl. J. Smart Sensing & Intelligent Syst.**, 2 (2009) 503-14 (ISSN 1178-5608)
18. "Role of catalysts and their nanoscale dispersal on the response characteristics of SnO<sub>2</sub> thin film H<sub>2</sub>S gas sensor", Arijit Chowdhuri, M. Tomar, K. Sreenivas and V. Gupta, **Philosophical Nature**, No.1 (2009) 195-204
19. "Response speed of SnO<sub>2</sub> based H<sub>2</sub>S gas sensors with CuO nanoparticles" Arijit Chowdhuri, Vinay Gupta, R. Kumar, P. K. Patanjali, S. Mozumdar and K. Sreenivas, **Applied Physics Letters** 84 (7) (2004) pp 1180-1182.
20. "Fast response H<sub>2</sub>S gas sensing characteristics with ultra-thin CuO islands on sputtered SnO<sub>2</sub>" Arijit Chowdhuri, Vinay Gupta and K. Sreenivas, **Sensors & Actuators B**, 93, (2003) 572 - 579.
21. "Thickness dependence effects of CuO islands on SnO<sub>2</sub> in the nano-scale range for H<sub>2</sub>S gas sensing applications" Arijit Chowdhuri, Vinay Gupta and K. Sreenivas **Reviews on**

**Advanced Materials Science (RAMS) 4 (1) (2003) pp 75-78. [ISSN: 1605-8127]**

22. "Enhanced catalytic activity of ultra-thin CuO islands on SnO<sub>2</sub> thin films for fast response H<sub>2</sub>S gas sensors" Arijit Chowdhuri, Vinay Gupta and K. Sreenivas, **IEEE Sensors Journal**, Vol. 3 (6) (Dec. 2003) 680-686.
23. "H<sub>2</sub>S gas sensing mechanism of SnO<sub>2</sub> films with ultrathin CuO dotted islands" Arijit Chowdhuri, Parmanand Sharma, Vinay Gupta, K. Sreenivas and K.V. Rao **Journal of Applied Physics**, 92 (4) (2002) 2172 - 2180.

### **Papers in refereed International Conference Proceedings**

1. "Varying sonication conditions to tailor surface morphology of GO thin films for enhanced gas sensing performance" – Vishal Dhingra, Shani Kumar, Arijit Chowdhuri, Amit Garg – AIP Conference Proceedings 2369, 020109 (2021); DOI: 10.1063/5.0060996
2. "Effect of Concentration Variation in Graphene Oxide (GO) Membranes For Water Flux Optimization" Shani Kumar, Amit Garg and Arijit Chowdhuri – AIP Conference Proceedings 1953, 030280 (2018); doi: 10.1063/1.5032615 Published by AIP Publishing. ISBN: 978-0-7354-1648-2
3. "Investigating gas sensing mechanism of Graphene Oxide (GO) thin films through cross-selectivity to various gases" - Shani Kumar, Vishal Dhingra, Amit Garg and Arijit Chowdhuri - AIP Conference Proceedings 1728, 020672 (2016); <https://doi.org/10.1063/1.4946723>, Published by AIP Publishing. ISBN: 978-0-7354-1375-7
4. "Zinc oxide doped graphene oxide films for gas sensing applications" - Chetna, , Shani Kumar, A. Garg, Arijit Chowdhuri, V. Dhingra, S. Chaudhary, and A. Kapoor - AIP Conference Proceedings 1728, 020579 (2016); <https://doi.org/10.1063/1.4946630>, Published by AIP Publishing. ISBN: 978-0-7354-1375-7
5. "Detection of TATP precursor acetone at trace levels using rf sputtered SnO<sub>2</sub> thin film-based sensors", Arijit Chowdhuri, Anjali Sharma, and Vinay Gupta, Proceedings of SPIE 8018, Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Sensing XII, 80181V (4 June 2011); doi: 10.1117/12.883761
6. "Fabrication of SnO<sub>2</sub> thin film based electronic nose for industrial environment", Divya Haridas, Arijit Chowdhuri, K. Sreenivas and Vinay Gupta, Proc. of IEEE Sensors Applications Symposium (SAS), 2010, held in Limerick, Ireland from 23 – 25 February 2010 Art. no. 5439413, pp. 212-15
7. "Enhanced Response Characteristics of SnO<sub>2</sub> Thin Film Loaded with Nanoscale Catalytic Clusters for Methane Gas" - Divya Haridas, Arijit Chowdhuri, K. Sreenivas and Vinay Gupta; under Symposium Y: Nanomaterials Integration for Electronics, Energy, and Sensing at MRS 2010 Fall Meeting held from 29th Nov. – 03 December 2010, Boston, MA, USA



8. "Bi-layered sensor structures (SnO<sub>2</sub> film-CuO nanolayer) with improved response characteristics for H<sub>2</sub>S gas" - Manish Verma, Arijit Chowdhuri, K Sreenivas, Vinay Gupta, Proceedings of International conference IEEE Sensors 2009, held at Christchurch, New Zealand from 25 – 28 October 2009, pp 1132 – 1134
9. "Enhanced photo-response of thermally treated zinc oxide ultra-violet photo detector with furnace method and pulsed laser irradiation" Rashmi Menon, Arijit Chowdhuri, Monika Tomar, K. Sreenivas, and Vinay Gupta, Proc. of International conference IEEE Sensors 2009, held at Christchurch, New Zealand from 25 – 28 October 2009, pp 437 – 440
10. "Enhanced oxygen adsorption activity by CuO catalyst clusters on SnO<sub>2</sub> thin film based sensors" Arijit Chowdhuri, Divya Haridas, K. Sreenivas and Vinay Gupta Proc. of Int'l Conf. on Sensing Technology (ICST) 2008, Tainan, Taiwan Nov 30 - Dec 03, 2008, pp 147.
11. "Enhanced LPG response characteristics of SnO<sub>2</sub> thin film based sensors loaded with Pt clusters" Divya Haridas, Arijit Chowdhuri, K. Sreenivas and Vinay Gupta Proc. of Int'l Conf. on Sensing Technology (ICST) 2008, Tainan, Taiwan Nov 30 - Dec 03, 2008, pp 119.
12. "Improved response of H<sub>2</sub>S gas sensors with CuO nanoparticles on SnO<sub>2</sub> film" Arijit Chowdhuri, Vinay Gupta, R. Kumar, P. K. Patanjali, S. Mozumdar and K. Sreenivas, Proc. of IEEE Sensors 2003 Intl. Conference held in Toronto, Canada from 22 - 24 October 2003.
13. "Enhanced catalytic activity of ultra-thin CuO islands on SnO<sub>2</sub> thin films for fast response H<sub>2</sub>S gas sensors" Arijit Chowdhuri, Vinay Gupta and K. Sreenivas, Proc. of IEEE Sensors 2002 Conference, Orlando, Florida, USA, 11-14 June 2002, pp 430-434/009, held at Christchurch, New Zealand from 25 – 28 October 2009, pp 1132 – 1134

#### **Papers in refereed National Journals**

1. 'Gauging the nature and magnitude of Particulate Matter (PM) concentrations in Bengaluru, the IT capital of India - Charu K. Gupta, Jatinder Pal Singh, Priya Chopra, V. Bhasker Raj and Arijit Chowdhuri – **DU Journal of Undergraduate Research and Innovation** Volume 3, Issue 2, (2017) pp 71-81 [ISSN: 2395-2334]
2. 'A particulate Matter Based Real-Time Analysis of Odd-Even Car Experiment in Delhi' - Charu Khosla Gupta, Shweta Singh, Abhishek Singh, Pragya Yagnik, Bishal K. Das and Arijit Chowdhuri – **DU Journal of Undergraduate Research and Innovation** Volume 2 , Issue 1 (2016) pp 31- 39 [ISSN: 2395-2334]
3. "Assuaging Human Health Concerns Through Analysis of Physicochemical Parameters of Potable Water Samples in Delhi" – Arijit Chowdhuri, Bishal K. Das, Shweta Singh and Charu K. Gupta, Journal of **Innovation for Inclusive Development (JIID)**, 1 (1) (2016) 20 – 25. [ISSN: 2456 - 4478]
4. "Influence of CuO catalyst in the nano-scale range on SnO<sub>2</sub> surface for H<sub>2</sub>S gas sensing applications" Vinay Gupta, S. Mozumdar, Arijit Chowdhuri and K. Sreenivas, **Pramana**

Conference/ Presentations/Workshops

**Abstracts in International Conferences (refereed):**

1. "Enhancing water filtration capacities by tailoring interlayer spacings of Graphene Oxide (GO) membranes" – Amit Garg, Arijit Chowdhuri and Shani Kumar – 3rd International Conference on Materials Science and Materials Chemistry, 14 – 15 October 2019, Vienna, AUSTRIA, pp 40.
2. "Investigating the role of ICT infrastructure in influencing the uptake of educational innovation and development of digital competencies amongst students in primary-education classrooms of Government funded schools in Delhi, INDIA" – Arijit Chowdhuri, Charu Khosla Gupta and Divya Mann – International Conference on Education 2019 (ICEDU 2019) 5 – 7 April 2019, Kuala Lumpur, Malaysia pp 85 [ISBN 978-955-3605-28-3]
3. "Addressing issues of environmental pollution by initiating a paradigm shift in scientific temperament at the grass-root level of primary school education" Charu Khosla Gupta and Arijit Chowdhuri – International Conference on Education 2019 (ICEDU 2019) 5 – 7 April 2019, Kuala Lumpur, Malaysia pp 11[ISBN 978-955-3605-28-3]
4. "Room temperature detection of H<sub>2</sub> and H<sub>2</sub>S gases by Graphene oxide (GO) films using Surface Plasmon Resonance (SPR) technique" – Anshuman Tripathi, Yogesh Shukla, Akash Gupta, Shani Kumar, Amit Garg and Arijit Chowdhuri – International Conference on Advanced Materials Energy & Environmental Sustainability (ICAMEES-2018) 14 – 15 December 2018, University of Petroleum & Energy Studies, Dehradun, Uttarakhand, INDIA pp 37
5. "Preliminary studies on estimating the composition and concentration levels of dangerous metals in fine dust at Dariba Kalan, Delhi: human health concerns" - Charu Khosla Gupta, Jatinder Pal Singh, Priya Chopra and Arijit Chowdhuri – International Symposium on Ciliate Biology (ISCB 2018) 4 – 6 April 2018, India Habitat Centre, New Delhi, INDIA pp 108
6. "Potential health risks arising from Ambient Air Pollution (AAP) due to variation in PM<sub>10</sub>, SO<sub>x</sub>, NO<sub>x</sub> and CO concentration levels in New Delhi, Bengaluru (India) and Ljubljana (Slovenia): A spatio-temporal study" - Arijit Chowdhuri, Priya Chopra, Jatinder Pal Singh, Anju Gupta and Charu Khosla Gupta – International Symposium on Ciliate Biology (ISCB 2018) 4 – 6 April 2018, India Habitat Centre, New Delhi, INDIA pp 111
7. "NiO-SnO<sub>2</sub> heterostructure thin films based low temperature SO<sub>2</sub> gas sensor" – P. Tyagi, A. Sharma, Arijit Chowdhuri, Monika Tomar and Vinay Gupta – 6th International Symposium on Integrated Functionalities (ISIF - 2017) 10 - 13 December 2017, Hotel Shangri-La Eros, New Delhi, INDIA pp 99
8. "Measuring ambient air pollution using data envelope analysis with principal components: an



exposure – response assessment” - Arijit Chowdhuri, Charu Khosla Gupta, V. Bhasker Raj, and Vineet Kumar Singh - 3rd International Conference On Environmental Science and Technology (ICOEST - 2017) 19 – 23 October 2017, Budapest, HUNGARY pp 46 [ISBN 978-605-83575-6-3]

9. “Preliminary assessment of simultaneous emission of PM<sub>0.5</sub>, PM<sub>2.5</sub> and CO from incense and mosquito repellents contributing to non-discernible pollution within Asian households” - Charu Khosla Gupta, V. Bhasker Raj, Arijit Chowdhuri - 3rd International Conference On Environmental Science and Technology (ICOEST - 2017) 19 – 23 October 2017, Budapest, HUNGARY pp 47 [ISBN 978-605-83575-6-3]
10. “Comparison of water purification properties of Cu and Ag nanoparticles decorated Graphene Oxide (GO) membranes” - Shani Kumar, Amit Garg and Arijit Chowdhuri - 2nd International Conference on Recent Advances in Nanoscience and Nanotechnology-2016 (ICRANN-2016), 19 – 20 December, 2016, Special Centre for Nano Sciences, Jawaharlal Nehru University, New Delhi-110067 pp 44
11. “Graphene Oxide (GO) thin films loaded with Cu and Ag nanoparticles for gas sensing applications”- Vishal Dhingra, Shani Kumar, Amit Garg and Arijit Chowdhuri - 2nd International Conference on Recent Advances in Nanoscience and Nanotechnology-2016 (ICRANN-2016), 19 – 20 December, 2016, Special Centre for Nano Sciences, Jawaharlal Nehru University, New Delhi-110067 pp 107
12. “Comparison of atmospheric mercury (Hg<sub>0</sub>) concentration levels in air at Hg mine area in Idrija, Slovenia and wholesale gold market in Dariba Kalan, Delhi, India” – Charu K. Gupta, David Kocman and Arijit Chowdhuri, International Conference on Strategies for Environmental Protection and Management (ICSEPM - 2016) held from 11 – 13 December 2016 at Jawaharlal Nehru University, New Delhi – 110 067, INDIA pp O3 – O4
13. “Remote monitoring of landfill gas concentrations in real-time from MSW landfills in Delhi using portable and autonomous Electronic Nose” – Arijit Chowdhuri and Charu K. Gupta, International Conference on Strategies for Environmental Protection and Management (ICSEPM - 2016) held from 11 – 13 December 2016 at Jawaharlal Nehru University, New Delhi – 110 067, INDIA pp ES 2 – ES 3
14. “Development of Graphene Oxide (GO) membrane embedded with Cu nanoparticles for water purification applications” - Shani Kumar, Amit Garg and Arijit Chowdhuri, International Conference on Advances in Nanomaterials and Nanotechnology (ICANN - 2016) held from 4 – 5 November 2016 at Jamia Milia Islamia, New Delhi – 110 025, INDIA pp 401 [ISBN: 978-93-85000-94-2]
15. “Investigating gas sensing mechanism of Graphene Oxide (GO) thin films through cross-selectivity to various gases” - Shani Kumar, Vishal Dhingra, Amit Garg and Arijit Chowdhuri - Proc. of International Conference on Condensed Matter and Applied Physics (ICC 2015), 30 – 31 October 2015, Bikaner, Rajasthan INDIA pp 928
16. “Detection of trace-level H<sub>2</sub>S, SO<sub>2</sub> and H<sub>2</sub> gas concentrations using nanocrystalline SnO<sub>2</sub> thin films loaded with CuO nanoparticles” – Charu K. Gupta and Arijit Chowdhuri, Proc. of 22nd International Symposium on Environmental Biogeochemistry (ISEB 2015) 28th September – 2nd

October 2015 Piran-Portoroz, SLOVENIA pp 91

17. "Real-time measurement of gaseous emissions from unrestrained MSW landfills located in Delhi, India using Electronic-Nose (E-Nose)" – Arijit Chowdhuri, Shubham Raj and Charu K. Gupta, Proc. of 22nd International Symposium on Environmental Biogeochemistry (ISEB 2015), 28th September – 2nd October 2015 Piran-Portoroz, SLOVENIA P - 49, pp 142
18. "Significant amount of Carbon Monoxide (CO) generation with heater operation within the microenvironment of a closed car cabin" – Charu K. Gupta, Nikhil Kumar, Saptarshi Chakrabarty and Arijit Chowdhuri, Proc. of 22nd International Symposium on Environmental Biogeochemistry (ISEB 2015) 28th September – 2nd October 2015 Piran-Portoroz, SLOVENIA P – 50, pp 143
19. "Carbon monoxide (CO) generation within the micro-environment of households through regular usage of popular incense and anti-mosquito repellants" – Shweta Singh, Pragya Yagnik, Charu K. Gupta and Arijit Chowdhuri, Proc. of 3rd Indo-UK seminar on Recent Advances in Chemical Sensor (IUCRACS 2015), 25 – 26 August 2015, Gargi College (University of Delhi) INDIA pp 21
20. "An investigation of the physico-chemical parameters of water samples in Delhi: estimating potable quality and assuaging human health concerns" - Arijit Chowdhuri and Charu K. Gupta, Proc. of 7th Int'l Congress of Environmental Research (ICER – 2014), 26 – 28 December 2014, RVC College of Engineering, Bengaluru, INDIA pp 266 [ISBN : 978-81-909379-7-9]
21. "Indoor and outdoor pollutant gas sensing using ultra low-cost electronic nose" - Charu K. Gupta and Arijit Chowdhuri - Proc. of 7th Int'l Congress of Environmental Research (ICER – 2014), 26 – 28 December 2014, RVC College of Engineering, Bengaluru, INDIA pp 625 [ISBN : 978-81-909379-7-9]
22. "Gas sensing characteristics of graphene oxide loaded with nanocrystalline ZnO clusters" – Shani Kumar, Vishal Dhingra, Amit Garg and Arijit Chowdhuri, Proc. of Int'l Conference on Recent Advances in Nanoscience and Nanotechnology (ICRANN 2014), 15 – 16 December 2014 Special Centre for Nanoscience Jawaharlal Nehru University, New Delhi – 110 067, INDIA pp 91
23. "Low cost 'Smart' switch for designing Electronic Nose (E-Nose) for gas sensing applications" - Nikhil Kumar, Saptarshi Chakrabarty, Shobha Badola, Sunita Narang, Charu K. Gupta and Arijit Chowdhuri, Proc. of 2nd Int'l Conference on Innovative Trends in Applied Physical, Chemical, Mathematical, Statistical Sciences and Emerging Energy Technology for Sustainable Development" (APCMSET-2014), 19 – 20 July 2014, Jawaharlal Nehru University, New Delhi – 110 067, INDIA
24. "Using mobile phones with android OS for measuring hazardous gas concentrations detected using Electronic Nose (E-Nose)" - Prayas Tiwari, Ashish Pokhriyal, Pankaj Rawat, Charu K. Gupta, Sunita Narang and Arijit Chowdhuri, Proc. of 2nd Int'l Conference on Innovative Trends in Applied Physical, Chemical, Mathematical, Statistical Sciences and Emerging Energy Technology for Sustainable Development" (APCMSET-2014), 19 – 20 July 2014, Jawaharlal Nehru University, New Delhi – 110 067, INDIA

25. "A novel OER initiative under University of Delhi's new Four Year Undergraduate Programme: an investigation into the Pedagogical Impact" – Arijit Chowdhuri and Charu K. Gupta, Proc. of OCWC Global 2014: Open Education for a Multicultural World, 23 – 25 April 2014, Ljubljana, SLOVENIA
26. "Effect of spinner rotation speed and post-annealing on the optical constants of ZnO thin film" - Arijit Chowdhuri, Pinky Rehman, V. Bhasker Raj and Amit Garg, Proc. of Int'l Conf. on Innovative Trends in Applied Physical, Chemical, Mathematical Sciences and Emerging Energy Technology for Sustainable Development (APCMET-2014), 19 – 20 April 2014, Jawahar Lal Nehru University, New Delhi, INDIA
27. "Evaluation of physico-chemical parameters of potable water in Delhi: human health concerns" Abdul Jafar, Abhishek Srivastava, Amit Dubey, Arijit Chowdhuri and Charu K. Gupta, Proc. of 1st Indo – UK seminar on Recent Advances in Chemical Sensors (UGC-UKIERI IUCRACS-2014) 10 -11 February 2014, Gargi College, New Delhi-110 049, INDIA pp 28
28. "An investigation of CO<sub>2</sub> generation characteristics of commercially available antacid (ENO) of different flavours (Cola, Orange and Lemon)" Sandal Azhar, Prithvi Singh, Sunita Narang, Subhash Kumar, Charu K. Gupta, Arijit Chowdhuri, Proc. of 1st Indo – UK seminar on Recent Advances in Chemical Sensors (UGC-UKIERI IUCRACS-2014) 10-11 February 2014, Gargi College, New Delhi-110 049, INDIA pp 28
29. "Surface Plasmon Resonance Study on Effect of Momordica Charantia L. (Bitter gourd) on Glucose", Shibu Saha, Arijit Chowdhuri, Navina Mehan, K. Sreenivas and Vinay Gupta Proc. of Intl. Conference Nanophotonics Downunder 2009: Devices and Applications (SMONP 2009) Melbourne, Australia 21 – 24 June 2009, pp 251
30. "Photo-conductive studies of Zinc oxide Nanowires grown by Vapour-Liquid-Solid method", Rashmi Menon, Arijit Chowdhuri, H.H. Tan, C. Jagadish, K. Sreenivas and Vinay Gupta Proc. of Intl. Conference Nanophotonics Downunder 2009: Devices and Applications (SMONP 2009) Melbourne, Australia 21 – 24 June 2009, pp 249
31. "Trace level H<sub>2</sub>S gas detection with sputtered SnO<sub>2</sub> thin films loaded with CuO nanoparticles" Arijit Chowdhuri, Vinay Gupta and K. Sreenivas Proc. of Indo-Australia Symposium on Multifunctional Nanomaterials, Nanostructures and Applications (MNNA 2007), University of Delhi, Delhi – 7, INDIA, 19 - 21 Dec. 2007, P – 133
32. "Ultra-thin CuO film on SnO<sub>2</sub> in the nano-scale range for H<sub>2</sub>S gas sensing" Arijit Chowdhuri, P. Sharma, Vinay Gupta, K. Sreenivas and K. V. Rao Proc. of NANO-2002 Intl. Conference, Orlando, Florida, USA 16-20 June, 2002, No. PC4.6
33. "Fast response H<sub>2</sub>S gas sensing characteristics with ultra-thin CuO islands on sputtered SnO<sub>2</sub>" Arijit Chowdhuri, Vinay Gupta and K. Sreenivas, Intl. Meeting on Chemical Sensors 9 (IMCS-9), Boston, USA, 7-10 July, 2002, pp 149.

### **Abstracts in National Conferences:**

1. "Carbon Dioxide (CO<sub>2</sub>) detection at room temperature using Graphene Oxide (GO) coating on Quartz Crystal Microbalance (QCM)" – Jatinder Pal Singh, Siddharth Das, Priya Chopra, Shani Kumar, Amit Garg, Charu Khosla Gupta and Arijit Chowdhuri – 2nd National Conference on New Trends in Nanotechnology and Applications (NTNA – 2020), 06 – 07 February 2020 held at Atma Ram Sanatan Dharma College (University of Delhi) – OT 11 – **This work received best Oral Presentation award**
2. "Investigating carbon dioxide gas sensing characteristics of Graphene oxide (GO) films using a Quartz Crystal Microbalance (QCM) based device" – Siddharth Das, Jatinder Pal Singh, Akash Gupta, Shani Kumar, Amit Garg and Arijit Chowdhuri - **National Seminar on New Trends in Nanotechnology and Applications (NTNA-2018)**, 27 – 28 September 2018 held at Atma Ram Sanatan Dharm College (University of Delhi) pp 03
3. "Investigating H<sub>2</sub> and H<sub>2</sub>S gas mechanism of Graphene oxide (GO) films using Surface Plasmon Resonance" – Anshuman Tripathi, Yogesh Shukla, Shani Kumar, Amit Garg and Arijit Chowdhuri – **National Seminar on New Trends in Nanotechnology and Applications (NTNA-2018)**, 27 – 28 September 2018 held at Atma Ram Sanatan Dharm College (University of Delhi) pp 05
4. "Investigating the effect of Cadmium and ethidium bromide on DNA using Surface Plasmon Resonance (SPR) technique" – Charu Khosla Gupta, Chaitanya Raj, Senjuti Sengupta, Ravi Toteja, Seema Makhija, and Arijit Chowdhuri – **National Seminar on New Trends in Nanotechnology and Applications (NTNA-2018)**, 27 – 28 September 2018 held at Atma Ram Sanatan Dharm College (University of Delhi) pp 17 – **This work received Best Paper Award**
5. "Study of Particulate Matter Pollution in Different Modes of Public Transport in New Delhi, India" Charu Khosla Gupta, Medha Jha, Manohar S. Bisht and Arijit Chowdhuri – **4<sup>th</sup> National Symposium on Environment: Green Technology for Environmental Sustainability**, 25 September 2018 held at Deshbandhu College (University of Delhi) pp 48
6. "Gauging the Comprehension about Environmental Awareness, Conservation and Sustainability Amongst Primary, Secondary and Undergraduate Students for Precisely Defining Exposure–Response Relationships of Pollution on Health" – Arijit Chowdhuri, Sakshi Saraswat, and Charu Khosla Gupta – **4<sup>th</sup> National Symposium on Environment: Green Technology for Environmental Sustainability**, 25 September 2018 held at Deshbandhu College (University of Delhi) pp 54
7. "Ambient air pollution (AAP) measurements using Electronic Nose at unrestrained MSW landfills located in Delhi" - Arijit Chowdhuri, Priya Chopra, Jatinder P. Singh, V. Bhasker Raj and Charu K. Gupta, Innovation Conclave - 2016 , 25 – 26 October 2016 held at Acharya Narendra Dev College (University of Delhi) pp 04

8. "Biological contamination in groundwater-an impending disaster" - Mayuri Mathuria, Pratyaksh Singh, Sarita Kumar, Arijit Chowdhuri and Charu Khosla Gupta, Innovation Conclave - 2016, 25 – 26 October 2016 held at Acharya Narendra Dev College (University of Delhi) pp 51
9. "Synthesis and characterization of metallic nanoparticles for water filtration units" - Harveen Kaur\*, Manoj Kumar, Arijit Chowdhuri, Charu K Gupta and Sarita Kumar, Innovation Conclave - 2016, 25 – 26 October 2016 held at Acharya Narendra Dev College (University of Delhi) pp 67
10. "Addressing posteriori environmental concern 21<sup>st</sup> century – Clean potable drinking water in households" – Charu Khosla Gupta, Shweta Singh, Pragya Yagnik, Bishal K. Das, Sarita Kumar and Arijit Chowdhuri, National Seminar on Water and Air quality in urban ecosystem, 22 March 2016 held at Shivaji College (University of Delhi) pp 35.
11. "Synthesis and characterization of copper nanoparticles (CuNPs) for water – purification" - Rahul Roy, Gayatri Rai, Aarti Sharma, Arijit Chowdhuri, Charu K Gupta and Sarita Kumar 2016 **Second National Symposium on Environment: Greener Future and Awareness**, Deshbandhu College, University of Delhi, March 19, 2016, pp 20.
12. "Carbon monoxide (CO) pollution within micro-environment of households from hidden and non-discernible sources" - Charu Khosla Gupta, Pragya Yagnik, Shweta Singh and Arijit Chowdhuri, **National Conference on Recent Advances in Materials and Field Theory (NCRAMFT – 2K15)**, 28 – 29 December 2015, held at Bhagwan Parashuram Institute of Technology (I. P. University) pp 28 [ISBN 978-93-5254-054-9]
13. "Particulate matter emissions from coal fired barbeque ovens – a potential source for pulmonary and cardiovascular diseases" - Charu Khosla Gupta, Shweta Singh, Pragya Yagnik, and Arijit Chowdhuri **National Conference on Recent Advances in Materials and Field Theory (NCRAMFT – 2K15)**, 28 – 29 December 2015, held at Bhagwan Parashuram Institute of Technology (I. P. University) pp 36 [ISBN 978-93-5254-054-9]
14. "Heater operation within the closed confines of a car during winter months in Delhi: evidence of toxic CO generation" – Bishal K. Das, Arvind Mamgain, Charu K. Gupta and Arijit Chowdhuri, **National Conference on Climate Change: Impacts, Adaptation, Mitigation scenario and Future challenges in Indian perspective**, 02 – 03 March, 2015, held at University of Delhi, Delhi – 110 007 INDIA pp 32 (ISBN: 978-93-5235-339-2)
15. "Health effects of exposure to ambient carbon monoxide within closed office space as a result of room heater operation during winter months in Delhi" – Abhishek Singh, Shiwani Katiyar, Arijit Chowdhuri and Charu K. Gupta, **National Conference on Climate Change: Impacts, Adaptation, Mitigation scenario and Future challenges in Indian perspective**, 02 – 03 March, 2015, held at University of Delhi, Delhi – 110 007 INDIA pp 33 (ISBN: 978-93-5235-339-2)

16. "Unbalanced magnetron sputtered SnO<sub>2</sub> and SnO<sub>2</sub>-CuO thin films for trace level H<sub>2</sub>S gas sensing", Pawan Kumar, Subhash Kumar and Arijit Chowdhuri, **27<sup>th</sup> PSSI National Symposium on Plasma Science and Technology (PLASMA 2012)**, Pondicherry University, Puducherry, 10 – 13 December 2012, pp 237 - 239
17. "Influence of nanosized catalysts on trace level H<sub>2</sub>S sensing characteristics of SnO<sub>2</sub> thin film based novel heterostructures", Arijit Chowdhuri, K. Sreenivas, and Vinay Gupta **7<sup>th</sup> National Conference on Physics (PANE 2010)**, Manipur University, Imphal, 05 – 06 December 2010, pp - 81.
18. "Integration of nano-scale catalysts with SnO<sub>2</sub> films for enhanced H<sub>2</sub>S and LPG sensing", D. Haridas, M. Verma, Arijit Chowdhuri, K. Sreenivas, and Vinay Gupta **NANO SENSORS 2008, National Workshop on Nano Sensors and Devices**, IIT Delhi, 22 – 23 December 2008, Delhi pp - 81.
19. "Role of CuO nanoparticles in enhanced H<sub>2</sub>S gas sensing characteristics on SnO<sub>2</sub> thin films" Arijit Chowdhuri, Vinay Gupta and K. Sreenivas **National Seminar on Multifunctional Nanomaterials, Nanostructures and Applications (MNNA 2006)**, Dept.of Physics & Astrophysics, Univ. of Delhi, Delhi – 110 007, INDIA, 22 - 23 December 2006, P – 79
20. "LiNbO<sub>3</sub> thin film SAW devices with zero TCD" Monika Tomar, Arijit Chowdhuri, Vinay Gupta and K. Sreenivas, **National Symposium on Ferroelectrics and Dielectrics (NSFD-XII)**, Poster presentation, Indian Institute of Science (I.I.Sc), Bangalore, INDIA in Dec 2003.
21. "Studies on catalyst-semiconductor interaction mechanisms using CuO-SnO<sub>2</sub> thin films" Arijit Chowdhuri and K. Sreenivas, **8<sup>th</sup> National Seminar on Physics and Tech. of Sensors (NSPTS-8)** held at IGCAR, Kalpakkam, Tamil Nadu, 27<sup>th</sup> Feb-1<sup>st</sup> March 2001, C 33.1 to C 33.3.
22. "Swift Heavy Ion bombardment effects on the micro-structure of CuO-SnO<sub>2</sub> films used for gas sensing applications" Arijit Chowdhuri and K. Sreenivas, **Mini-user workshop on Swift heavy ions** held at Nuclear Science Centre, Delhi on 16<sup>th</sup> June 2000.
23. "Sensing of corrosion rates of Ag in H<sub>2</sub>S using surface plasmon resonance technique" - N. Mehan, P. Sharma, Arijit Chowdhuri and A. Mansingh, **Proc. of 6<sup>th</sup> National seminar on Phys. and Tech. of Sensors (NSPTS-6)**, Thapar Institute of Engg. and Tech., Patiala, Punjab, 4-6<sup>th</sup> March 1999, C 19-1 to C 19-6.
24. "Sensing properties of evaporated and sputtered SnO<sub>2</sub>-CuO thin films" Arijit Chowdhuri, P. Sharma, Vinay Gupta & K. Sreenivas, **Proc. of 6<sup>th</sup> National Seminar on Physics and Tech. of Sensors (NSPTS-6)**, Thapar Institute of Engg. and Tech., Patiala, Punjab, 4-6<sup>th</sup>



March 1999, C 18-1 to C 18-7.

25. "Role of interstitial oxygen on the orientation of sputtered ZnO thin films" Vinay Gupta, Arijit Chowdhuri and Abhai Mansingh, **Xth National Symposium on Ferroelectrics and Dielectrics (NSFD-X)** held in IIT Madras from 16-18<sup>th</sup> December 1998.

Research Projects (Major Grants/Research Collaboration)

S. No.	Sponsoring Agency	Title of the Projects	Position	Tenure	Budget (Rs. Lakh)	
1.	Department of Science and Technology	Exposure-response assessment of Ambient Air Pollution (AAP) and Hg contamination in affected cities of India and Slovenia: A comparative study	PI <b>Bilateral project with Jozef Stefan Institute, Ljubljana, SLOVENIA</b>	May 2015 – November 2018	16.11	
2.	University of Delhi	Development of portable Electronic Nose prototype with autonomous & stand-alone operation for quantified Ambient Air Pollution (AAP) measurement using wireless data transfer protocol on Android® enabled mobile phones (ANDC - 304)	PI	September 2015 – November 2016	5.10	
3.	University of Delhi	Artificial Olfaction using E-NOSE – mimicking human nose for gas sensing applications (ANDC-204)	PI	November 2013 – March 2015	5.00	
4.	IEDC, Department of Science and Technology	Development of compact water purifier system	PI	2013 - 2014	1.00	
5.	University of Delhi	"CO <sub>2</sub> Gas Sensing – an ICT based investigation for pollution control" (ANDC-	PI	July 2012 – 2013	10.00	

		102)				
6.	<b>University of Delhi</b>	"Glucose Detection – a Biosensing approach" (ANDC-101)	PI	July 2012 – 2013	10.00	
7.	<b>IEDC, Department of Science and Technology</b>	Development of sensor module for gas sensing applications	PI	2012 - 2013	1.00	
8.	<b>DIT (Min. Inf. Tech. &amp; Commn.), Govt. of India</b>	Development of low cost real time monitoring system for detection of harmful gases	Co – PI	April 2010 – 2012	112.25	
9.	<b>National Programme on Micro and Smart Systems (NPMASS), Govt. of India</b>	Growth and characterization of composite matrices of SnO <sub>2</sub> thin film and nanocatalysts for automotive gas sensors	Co – PI	December 2010 – 2012	33.93	
10.	<b>Department of Science &amp; Technology, Govt. of India</b>	Development of magnetron source for Plasma assisted growth of Metal-oxide films for sensor applications	Co - PI	March 2009 – 2012	24.81	

#### Awards and Distinctions

- a) Research visit to Jozef Stefan Institute, Ljubljana, under the aegis of Indo-Slovenia bilateral project funded by DST, Govt. of India during a) May 2017 b) September – October 2015
- b) Visiting Fellow at the Department of Electronic Materials Engineering, Research School of Physics and Engineering, The Australian National University, Canberra, Australia in 2009
- c) Scientific Chair at 6<sup>th</sup> Int'l Conf. on Education 2020 scheduled to be held in April, 2020 at Bangkok, Thailand
- d) Session Chair for two tracks at the Int'l Conf. on Education 2019 (ICEDU 2019) held in April, 2019 at Kuala Lumpur, Malaysia
- e) Winner of Best Innovative Idea award for DU Innovation project ANDC 204 at Antardhvani 2015 (Academic & Cultural festival) held in February 2015 at University of Delhi
- f) Recognized for Teaching Excellence and Innovation by Hon'ble Vice Chancellor, at the 93<sup>rd</sup> Foundation Day of University of Delhi during the academic session 2014 – 15.
- g) Guided summer interns on the project 'Studies on understanding and measuring ambient air pollution (AAP)' from Banasthali Vidyapeeth, Rajasthan during May-June 2015

#### Association With Professional Bodies

- Ex-Member of the Institute of Electrical and Electronics Engineer (IEEE), USA
- Life member (OM No 7197) of Indian Association of Physics Teachers (IAPT)
- Life member (LM 975) of Plasma Science Society of India (PSSI)

#### Other Activities

##### **Brief research outcomes**

- Portable E-Nose prototype for Ambient Air Pollution measurement using wireless data transfer protocol
- Development of low-cost, portable water purifier prototype with physical, chemical and biological filtration for field water disinfection and potable water generation
- Indigenously designed a Gas Sensor Test Rig integrated with PC based automatic data-acquisition for precise measurements of sensor response (sub – ppm levels).
- Developed a fully packaged integrated SnO<sub>2</sub> thin film sensor device with a built-in micro-heater for H<sub>2</sub>S gas detection exhibiting fast response speed due to novel dispersal of catalyst in nano-scale range.
- Exploited successfully the spillover mechanism of distributed CuO catalysts on SnO<sub>2</sub> surface along with activation of enhanced oxygen activity for developing an efficient gas sensor with three order high sensitivity.
- Synthesized Cu and CuO nanoparticles (15 to 50 nm) by plasma processing and chemical route (Reverse Micelle).

##### **Other Distinctions**

- Member, Technical Committee (2009), University of Delhi for purchase of high-end equipments for the Fabrication Laboratory.
- Best Poster award at the 27th PSSI National Symposium on Plasma Science and Technology (PLASMA 2012) held at Pondicherry University, Puducherry, INDIA from 10 – 13 December 2012
- Best Poster award at the Third International Conference on Sensing Technology (ICST 2008) held at Tainan, Taiwan from 30 Nov. – 3 Dec. 2008
- Nominated for the Best Conference Paper Award during IEEE Sensors 2002 conference held from 11 - 14 June, 2002 in Orlando, Florida, USA.
- Received the best paper award titled “Sensing properties of evaporated and sputtered SnO<sub>2</sub>-CuO thin films”— at the 6th National Seminar on Physics and Technology of Sensors (NSPTS-6) held at Thapar Institute of Engineering and Technology, Patiala, Punjab from 4 - 6 March, 1999.
- Received certificate of merit from Delhi Administration, Govt. of India for outstanding performance in the secondary board examination.

