

List of Publications:

Patents:

1. **Title:** Point-of-care detection of ethanol in human breath and other analytes
Status: Granted **Patent No:** IN 446162 **Grant Date:** 21-08-2023
Application No: 201931040108 **Filing Date:** 03-10-2019
Inventors: Nirmal Roy, Shirsendu Mitra, Dipankar Bandyopadhyay, Harshal B. Nemade, Tapas K. Mandal
2. **Title:** Paper based flexible and selfpowered UV photodetector
Status: Granted **Patent No:** IN 574410 **Grant Date:** 24-11-2025
Application No: 202031051178 **Filing Date:** 24-11-2020
Inventors: Rupam Sinha, Nirmal Roy, Tapas K. Mandal
3. **Title:** Carbon dot and ZnO composite based photorechargeable supercapacitor
Status: Published **Application No:** 202431018303 **Filing Date:** 13-03-2024
Inventors: Rupam Sinha, Nirmal Roy, Tapas K. Mandal

Journals:

2025

1. Nirmal Roy, “Investigating Cs₂SnI₆ as a promising material for high-performance self-powered broadband photodetection application”, *Journal of Physics and Chemistry of Solids*, 203, 112730, 2025. DOI: [10.1016/j.jpics.2025.112730](https://doi.org/10.1016/j.jpics.2025.112730) (Impact Factor: 4.9).
2. Vivek Dubey, Anupam Srivastava, Rupam Sinha, Nirmal Roy, “Design and optimization of high-performance MoSe₂/PC₆₀BM heterostructure based self-powered photodetector”, *Materials Science and Engineering: B*, 314, 118018, 2025. DOI: [10.1016/j.mseb.2025.118018](https://doi.org/10.1016/j.mseb.2025.118018) (Impact Factor: 4.6).

2024

3. Anupam Srivastava, A V Ullas, Nirmal Roy, “Theoretical design and performance evaluation of a lead-free fully inorganic CIGS solar cell with CuSbS₂ as HTL”, *Journal of Physics and Chemistry of Solids*, 196, 112331, 2024. DOI: [10.1016/j.jpics.2024.112331](https://doi.org/10.1016/j.jpics.2024.112331) (Impact Factor: 4.9).

4. Anupam Srivastava, A V Ullas, **Nirmal Roy**, “Efficiency enhancement and optimization of lead-free Cs₂PtI₆ perovskite solar cell”, *Physica Scripta*, 99, 095537, 2024. DOI: [10.1088/1402-4896/ad6d1c](https://doi.org/10.1088/1402-4896/ad6d1c) (Impact Factor: 2.6).
5. **Nirmal Roy**, “Design and performance evaluation of MoS₂ photodetector in vertical MSM configuration”, *Optical Materials*, 148, 114817, 2024. DOI: [10.1016/j.optmat.2023.114817](https://doi.org/10.1016/j.optmat.2023.114817) (Impact Factor: 4.2).

2023

6. Rupam Sinha, **Nirmal Roy**, Tapas K. Mandal, “N-doped carbon dots and ZnO conglomerated electrodes for optically responsive supercapacitor applications”, *Langmuir*, 39 (12), 4518-4529, 2023. DOI: [10.1021/acs.langmuir.3c00300](https://doi.org/10.1021/acs.langmuir.3c00300) (Impact Factor: 3.9).

2022

7. **Nirmal Roy**, Rupam Sinha, Harshal B. Nemade, Tapas K. Mandal, “Synthesis of MoS₂-CuO nanocomposite for room temperature acetone gas sensing application”, *Journal of Alloys and Compounds*, 910, 164891, 2022. DOI: [10.1016/j.jallcom.2022.164891](https://doi.org/10.1016/j.jallcom.2022.164891) (Impact Factor: 6.3).
8. Rupam Sinha, **Nirmal Roy**, Tapas K. Mandal, “SWCNT/ZnO nanocomposite decorated with carbon dots for photoresponsive supercapacitor applications”, *Chemical Engineering Journal*, 431, 133915, 2022. DOI: [10.1016/j.cej.2021.133915](https://doi.org/10.1016/j.cej.2021.133915) (Impact Factor: 16.744).

2021

9. **Nirmal Roy**, Shirsendu Mitra, Harshal B. Nemade, Tapas K. Mandal, “Non-enzymatic urea sensing based on MWCNT nanocomposite”, *IEEE Sensors Journal*, 21 (17), 18417-18424, 2021. DOI: [10.1109/JSEN.2021.3088752](https://doi.org/10.1109/JSEN.2021.3088752) (Impact Factor: 4.5).
10. Rupam Sinha, **Nirmal Roy**, Ravula Rajasekhar, Aabhas Karnawat, Tapas K. Mandal, “N-doped carbon dot from cigarette-tobacco: Picric acid sensing in real water sample and synthesis of CD-MWCNT nano-composite for UV-photodetection”, *Journal of Environmental Chemical Engineering*, 9 (1), 104971, 2021. DOI: [10.1016/j.jece.2020.104971](https://doi.org/10.1016/j.jece.2020.104971) (Impact Factor: 7.2).

2020

11. **Nirmal Roy**, Rupam Sinha, Thomas T. Daniel, Harshal B. Nemade, Tapas K. Mandal, “Highly sensitive room temperature CO gas sensor based on MWCNT-PDDA composite”, *IEEE Sensors Journal*, 20 (22), 13245-13252, 2020. DOI: [10.1109/JSEN.2020.3004994](https://doi.org/10.1109/JSEN.2020.3004994) (Impact Factor: 4.5).

12. Rupam Sinha, **Nirmal Roy**, Tapas K. Mandal, “Growth of carbon dot-decorated ZnO nanorods on a graphite-coated paper substrate to fabricate a flexible and self-powered Schottky diode for UV detection”, *ACS Applied Materials & Interfaces*, 12 (29), 33428-33438, 2020. DOI: [10.1021/acsami.0c10484](https://doi.org/10.1021/acsami.0c10484) (Impact Factor: 8.2).
13. Shirsendu Mitra, **Nirmal Roy**, Surjendu Maity, Dipankar Bandyopadhyay, “Multimodal chemo-/magneto-/phototaxis of 3G CNT-bots to power fuel cells”, *Microsystems & Nanoengineering*, 6 (19), 1-12, 2020. DOI: [10.1038/s41378019-0122-x](https://doi.org/10.1038/s41378019-0122-x) (Impact Factor: 9.9).
14. **Nirmal Roy**, Shirsendu Mitra, Nayan Mani Das, Nilanjan Mandal, Dipankar Bandyopadhyay, Harshal B. Nemade, Tapas K. Mandal, “Paper based enzymatic chemiresistor for POC detection of ethanol in human breath”, *IEEE Sensors Journal*, 20 (5), 2278-2286, 2020. DOI: [10.1109/JSEN.2019.2952940](https://doi.org/10.1109/JSEN.2019.2952940) (Impact Factor: 4.5).

2015

15. **Nirmal Roy**, Abhinav Gupta, and Sanjeev Rai, “Analytical surface potential modeling and simulation of junction-less double gate (JLDG) MOSFET for ultra low-power analog/RF circuits”, *Microelectronics Journal*, 46 (10), 916-922, 2015. DOI: [10.1016/j.mejo.2015.07.009](https://doi.org/10.1016/j.mejo.2015.07.009) (Impact Factor: 2.3).

Book Chapters:

1. **Nirmal Roy**, Nandlal Pingua, Rupam Sinha, “Solar Rechargeable Capacitors and Photosupercapacitors”, *Solar Capacitors and Batteries*, Chapter 2, Wiley, 2025.
2. Ankit Kumar Singh, Sanjeev Rai, **Nirmal Roy**, “Field Effect Transistors in Gas Sensing: Advances in Detection and Analysis of Diverse Gases”, *Classical to Quantum Transport in Multi-Dimensional Field Effect Transistors*, Chapter 12, CRC Press, 2025.
3. Kuldeep Mahato, **Nirmal Roy**, “Multimodal Sensing Arrays for Comprehensive Health Monitoring and Disease Management”, *Nano-bioelectronics for Precision Health Monitoring*, Chapter 10, Springer Nature, 2025.
4. **Nirmal Roy**, Anupam Srivastava, “Advancing Sustainable Photovoltaics: High-Efficiency Lead-Free Solar Cells Using CIGS, MoS₂, and ZnO”, *Advances in VLSI, Communication, and Signal Processing (VCAS 2024), Lecture Notes in Electrical Engineering, vol 1457*, Chapter 11, Springer, 2025.

Conferences:

1. **Nirmal Roy**, Anupam Srivastava, “Advancing Sustainable Photovoltaics: High-Efficiency Lead-Free Solar Cells Using CIGS, MoS₂, and ZnO”, *7th International Conference on VLSI, Communication and Signal Processing (VCAS-2024)*, MNNIT Allahabad, India, 2024. (Oral)
2. **Anupam Srivastava, AV Ullas, Nirmal Roy**, Advancements in Sustainable Photovoltaic Cells: Exploring the Potential of Single-Walled Carbon Nanotubes, *11th National Conference on Recent Trends in Materials Science and Technology (NCMST-2024)*, IIST Thiruvananthapuram, India, 2024. (Poster)
3. **Nirmal Roy**, Synthesis of surface modified carbon nanotube composite for environmental pollutant sensing application, *7th International Conference on Advanced Nanomaterial and Nanotechnology (ICANN-2021)*, IIT Guwahati, India, 2021. (Oral)
4. **Nirmal Roy**, Synthesis of surface modified carbon nanotube composite for environmental pollutant sensing application, *7th International Conference on Advanced Nanomaterial and Nanotechnology (ICANN-2021)*, IIT Guwahati, India, 2021. (Oral)
5. **Nirmal Roy**, Rupam Sinha, Tapas K. Mandal, PDDA functionalized MWCNT composite as room temperature CO sensor, *International Conference on Advances in Sustainable Research for Energy and Environmental Management (ASREEM-2021)*, SVNIT Surat, India, 2021. (Oral)
6. Rupam Sinha, **Nirmal Roy**, Tapas K. Mandal, Paper based flexible and self-powered UV photodetector, *International Conference on Advances in Sustainable Research for Energy and Environmental Management (ASREEM-2021)*, SVNIT Surat, India, 2021. (Oral)
7. **Nirmal Roy**, Paper based sensor for alcohol detection and its application as breath analyzer, *International Conference on Advances in Chemical Engineering-2020 (AdChE-2020)*, UPES Dehradun, India, 2020. (Oral)
8. **Nirmal Roy**, A disposable chemiresistive sensor based on Multiwall carbon nanotubes for alcohol detection, *6th International Conference on Advanced Nanomaterial and Nanotechnology (ICANN-2019)*, IIT Guwahati, India, 2019. (Poster)
9. Shirsendu Mitra, **Nirmal Roy**, and Dipankar Bandyopadhyay, Gold nanoparticle embedded modified MWCNT electrodes for electrochemical detection of arsenic in water, *ECS Meeting Abstracts*, MA2019-02, 2229, 2019. DOI: [10.1149/MA2019-02/51/2229](https://doi.org/10.1149/MA2019-02/51/2229)

10. **Nirmal Roy**, Surface modification of Multiwall carbon nanotubes and its applications on alcohol detection, *National Conference on Advanced Nanomaterials and their Applications (ANA-2018)*, MNNIT Allahabad, India. (Oral)
11. **Nirmal Roy**, Shirsendu Mitra, Tapas K. Mandal, Multiwall carbon nanotube based chemi-resistive sensor for urea detection, *12th International Conference on Complex Fluids and Soft Matter (COMPFLU -2018)*, IIT Roorkee, India. (Poster)
12. **Nirmal Roy**, MWCNT, AuNP nanocomposite based POCT sensor for quantitative detection of urea in biological samples, *Research Conclave 2018*, IIT Guwahati, India. (Poster)
13. **Nirmal Roy**, Computational performance evaluation of a probe coupled U-type waveguide rotary joint designed in X-band, *National Conference on Advances in Electronics & Communication Technology (AECT-2013)*, SRMS College of Engineering & Technology, Bareilly, India, 2013. (Oral)