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 **Filling 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 **Filling Date**: 24-11-2020
   Inventors: Rupam Sinha, **Nirmal Roy**, Tapas K. Mandal
3. **Title:** Carbon dot and ZnO composite based photorechargable supercapacitor
   Status: Granted **Patent No**: IN 601103 **Grant Date:** 01-09-2026
   Application No: 202431018303 **Filling Date**: 13-03-2024
   Inventors: Rupam Sinha, **Nirmal Roy**, Tapas K. Mandal

Journals:

1. Ankit Kumar Singh, **Nirmal Roy**, Sanjeev Rai, "Exploring WSe_2 in a vertical asymmetric MSM configuration for broadband photodetection", ***Journal of Physics and Chemistry of Solids***, 218, 113974, 2026. DOI: 10.1016/ j.jpcs.2026.113974 (**Impact Factor: 5.9**).
2. Vivek Dubey, Rupam Sinha, **Nirmal Roy**, "Performance analysis of $MoSe_2$/CdTe heterojunction for self-powered broadband photosensing applications", ***Materials Science and Engineering: B***, 330, 119550, 2026. DOI: 10.1016/j.mseb.2026.119550 (**Impact Factor: 5.7**).
3. Preetha Selvakumar, Nabendu Paul, **Nirmal Roy**, Rupam Sinha, "Investigation of "I" Variations in $CH_3NH_3SnI_xBr_{3-x}$ Perovskite Solar Cells: Simulation-Driven Selection and Optimization of $CH_3NH_3SnI_3$", ***ACS Applied Materials & Interfaces***, 18 (11), 16292–16306, 2026. **DOI:** 10.1021/acsami.5c21155 (**Impact Factor: 8.2**).
4. **Nirmal Roy,** "Investigating Cs_2SnI_6 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.jpcs.2025.112730 (**Impact Factor: 5.9**).
5. Vivek Dubey, Anupam Srivastava, Rupam Sinha, **Nirmal Roy**, "Design and optimization of high-performance $MoSe_2$/$PC_{60}BM$ heterostructure based self-powered photodetector", ***Materials***

Science and Engineering: B, 314, 118018, 2025. DOI: 10.1016/j.mseb.2025.118018 (**Impact Factor: 5.7**).

6. Anupam Srivastava, A V Ullas, **Nirmal Roy**, "Theoretical design and performance evaluation of a lead-free fully inorganic CIGS solar cell with $CuSbS_2$ as HTL", ***Journal of Physics and Chemistry of Solids***, 196, 112331, 2024. **DOI:** 10.1016/j.jpcs.2024.112331 (**Impact Factor: 5.9**).
7. Anupam Srivastava, A V Ullas, **Nirmal Roy**, "Efficiency enhancement and optimization of lead-free Cs_2PtI_6 perovskite solar cell", ***Physica Scripta***, 99, 095537, 2024. **DOI:** 10.1088/1402-4896/ad6d1c (**Impact Factor: 2.6**).
8. **Nirmal Roy**, "Design and performance evaluation of MoS_2 photodetector in vertical MSM configuration", ***Optical Materials***, 148, 114817, 2024. **DOI:** 10.1016/j.optmat.2023.114817 (**Impact Factor: 4.3**).
9. 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 (**Impact Factor: 4.4**).
10. **Nirmal Roy**, Rupam Sinha, Harshal B. Nemade, Tapas K. Mandal, "Synthesis of MoS_2-CuO nanocomposite for room temperature acetone gas sensing application", ***Journal of Alloys and Compounds*****,** 910, 164891, 2022. **DOI:** 10.1016/j.jallcom.2022.164891 (**Impact Factor: 6.7**).
11. 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 (**Impact Factor: 12.5**).
12. **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 (**Impact Factor: 4.5**).
13. 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 (**Impact Factor: 7.5**).
14. **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 (**Impact Factor: 4.5**).
15. 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 (**Impact Factor: 8.2**).

16. 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 (**Impact Factor: 11.1**).
17. **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 (**Impact Factor: 4.5**).
18. **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 (**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, MoS_2, 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, MoS_2, and ZnO", 7^{th} ***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, *11^{th}* ***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
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)