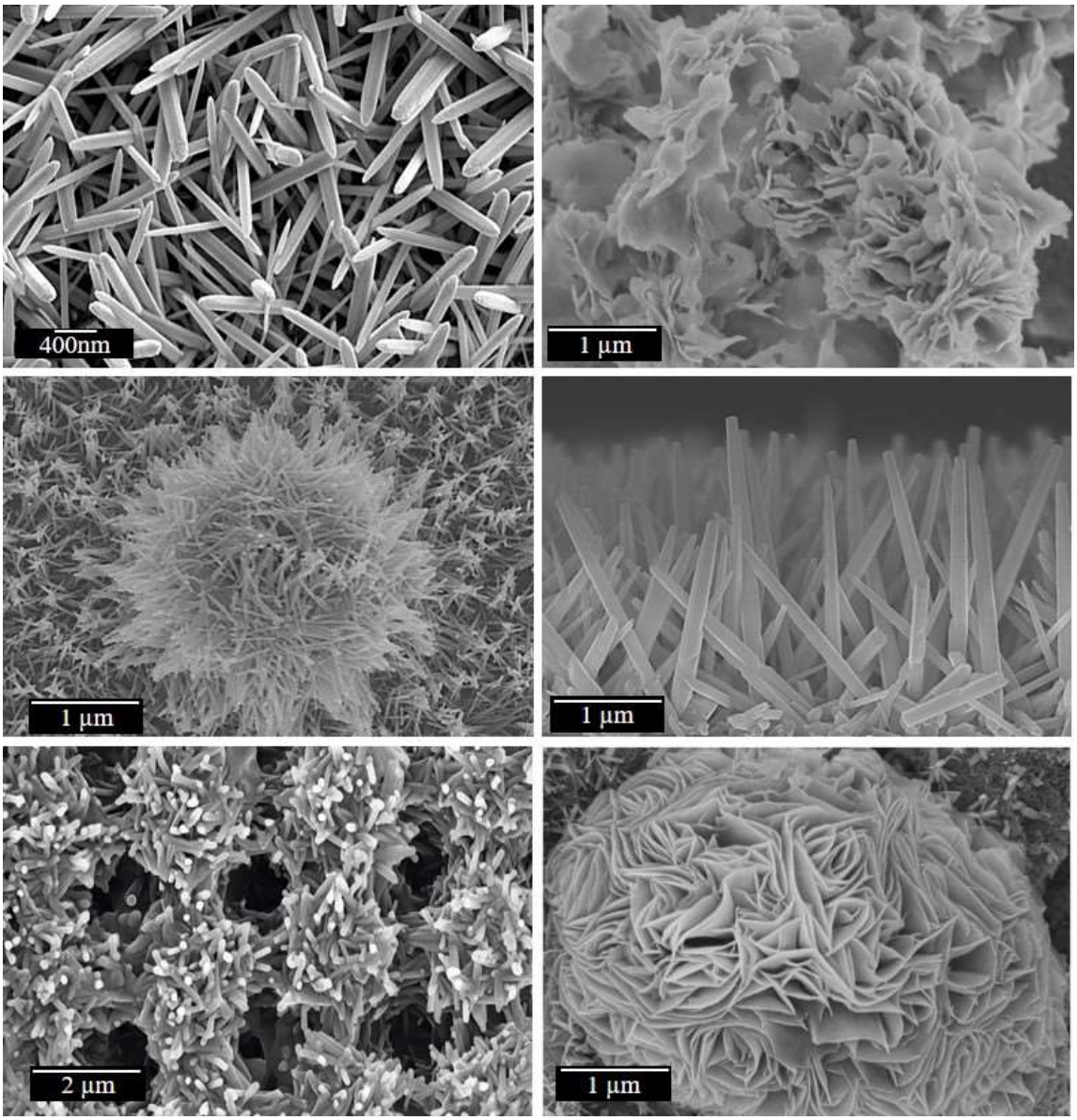
Annexure A

Various Multiscale structures



- Different ZnO-based micro/nanostructures synthesized at the Microtechnology Lab, IIT Jodhpur, using an aqueous synthesis route.

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Annexure B
List of Publications

A. Peer Reviewed International Journals (Published)

1) **Verma, G**.; Islam, M; Gupta, A; "ZnO Nanowire-Decorated 3D Printed Pyrolytic Carbon for Solar Wastewater Degradation". ***Advanced Composite and Hybrid Materials, 2025,*** 8, 109. https://doi.org/10.1007/s42114-024-01125-9 ***(Q1; IF: 23.2)***
2) **Verma, G**; and Gupta, A. "Next-Generation Chemiresistive Wearable Breath Sensors for Non-Invasive Healthcare Monitoring: Advances in Composite and Hybrid Materials,". ***Small, 2025***. https://doi.org/10.1002/smll.202411495 ***(Q1; IF: 13)***
3) **Verma, G**.; Kadiri, H.; Gokarna, A.; Kumar, S.; Kumar, M.; Lerondel, G.; Gupta, A. Flexible Hybrid Nanostructured Chemiresistive Sensing Platform for Low-Temperature Trace Hydrogen Detection. ***Sensors & Actuators B Chemical*** **2025**, *422*, 136621. https://doi.org/10.1016/J.SNB.2024.136621. ***(Q1; IF: 8.0)***
4) **Verma, G**.; Gupta, A.; "Room Temperature Operated Flexible Acetone Sensing Platform using MWCNTs/Nb_2O_5 Hybrid for Exhaled Diabetes Biomarker". ***Journal of Material Chemistry B, 2025***. https://doi.org/10.1039/D4TB02644F ***(Q1; IF: 6.7)***
5) **Verma, G**.; Venkatesan, P.; Barala. S.; Kumar, M.; Dega, N.; Gupta, A.; "Hierarchical MoS_2 Nanostructured Hollow Tubes on Biodegradable and Flexible Chitosan based Platform for Low-Temperature Hydrogen Gas Detection". ***IEEE Sensors Journal, 2025***. 10.1109/JSEN.2025.3538705 ***(Q1; IF: 4.3)***
6) **Verma, G.**; Gokarna, A.; Kadiri, H.; Lerondel, G.; Gupta, A. Flexible ZnO Nanowire Platform by Metal-Seeded Chemical Bath Deposition: Parametric Analysis and Predictive Modeling. ***Applied Materials Today*** **2024**, *40*, 102385. https://doi.org/10.1016/J.APMT.2024.102385. ***(Q1; IF: 7.2)***
7) **Verma, G.**; Gokarna, A.; Kadiri, H.; Nomenyo, K.; Lerondel, G.; Gupta, A. Multiplexed Gas Sensor: Fabrication Strategies, Recent Progress, and Challenges. ***ACS Sensors*** **2023**, *8* (9), 3320–3337. https://doi.org/10.1021/ACSSENSORS.3C01244. ***(Q1; IF: 8.2)***
8) **Verma, G.**; Venkatesan, P.; Roy, D.; Aloni, P.; Dega, N. K.; Gupta, A. Low Cost Fabrication of Continuous Flow Optofluidic Microreactor for Efficient Dye Degradation Using Graphene QDs@MOF (Ti) Photocatalyst. ***Environmental Research*** **2024**, *263*, 120207. https://doi.org/10.1016/J.ENVRES.2024.120207. ***(Q1; IF: 7.7)***
9) **Verma, G.**; Mondal, K.; Islam, M.; Gupta, A. Recent Advances in Advanced Micro and Nanomanufacturing for Wastewater Purification. ***ACS Applied Engineering Materials*** **2024**, *2* (2), 262–285. https://doi.org/10.1021/ACSAENM.3C00711.
10) **Verma, G.**; Islam, M.; Gupta, A. TiS2 Nanoparticle-Anchored Candle-Soot Decorated Carbon Nanofiber-Based Hydrophobic/Oleophilic Membrane for Oil/Water Separation. ***ACS ES&T Water*** **2023**, *3* (11), 3687–3695. https://doi.org/10.1021/ACSESTWATER.3C00445. ***(Q1; IF: 4.9)***
11) **Verma, G**.; Pandey, V.; Islam, M.; Kumar, M.; Gupta, A. Room Temperature Operated Flexible La-ZnO/MWCNTs Sensor for Ppb Level Carbon Monoxide Detection. ***Journal of Micromechanics and Microengineering*** **2023**, *33* (9), 095003. https://doi.org/10.1088/1361-6439/ACE4D5. ***(Q2; IF: 2.4)***
12) **Verma, G.**; Singhal, S.; Rai, P. K.; Gupta, A. A Simple Approach to Develop a Paper-Based Biosensor for Real-Time Uric Acid Detection. ***Analytical Methods*** **2023**, *15* (24), 2955–2963. https://doi.org/10.1039/D3AY00613A. ***(Q2; IF: 2.7)***

13) **Verma, G.**; Singhal, S.; Gupta, A. Nature Inspired Ficus Religiosa Leaf Mesh Coated with Antibacterial ZnO/PANi@PMMA Nanocomposite for Separation and Water Purification. ***Catalysis Communication*** **2023**, *185*, 106806. https://doi.org/10.1016/J.CATCOM.2023.106806. ***(Q1; IF: 3.7)***
14) **Verma, G.** *†*; Rai, P. K. *†*; Korvink, J. G.; Islam, M.; Gupta, A. Integrated Electrochemical and Photocatalytic Degradation Using ZnO Caterpillars Photocatalyst: Two-Step Approach for Textile Industry Based Wastewater Recovery. ***Materials Science & Engineering B*** **2022**, *286*, 116078. https://doi.org/10.1016/J.MSEB.2022.116078. (*†Equal Co-authors)* ***(Q1; IF: 3.9)***
15) **Verma, G**.; Islam, M.; Gupta, A. Real-Time Degradation of Methylene Blue Using Bio-Inspired Superhydrophobic PDMS Tube Coated with Ta-ZnO Composite. ***Chemical Engineering Journal Advances*** **2022**, *12*, 100423. https://doi.org/10.1016/J.CEJA.2022.100423. ***(Q1; IF: 5.5)***
16) **Verma, G.**; Gupta, A. Sensing Performance of Room Temperature Operated MEMS Gas Sensor for Ppb Level Detection of Hydrogen Sulfide: A Review. ***Journal of Micromechanics and Microengineering*** **2022**, *32* (9), 094002. https://doi.org/10.1088/1361-6439/AC82F8. ***(Q2; IF: 2.4)***
17) **Verma, G.**; Sheshkar, N.; Pandey, C.; Gupta, A. Recent Trends of Silicon Elastomer-Based Nanocomposites and Their Sensing Applications. ***Journal of Polymer Research*** *2022 295* **2022**, *29* (5), 1–26. https://doi.org/10.1007/S10965-022-03044-Z. ***(Q2; IF: 2.6)***
18) **Verma, G.**; Gupta, A. Superhydrophobic ZnO-Au Nanocomposite over Polydimethylsiloxane Tubes for Efficient Photocatalytic Dye Degradation. ***Applied Nanoscience*** **2022**, *12* (7), 2091–2102. https://doi.org/10.1007/S13204-022-02479-6. ***(Q2; IF: 3.0)***
19) **Verma, G.**; Gupta, A. Recent Development in Carbon Nanotubes Based Gas Sensors. ***Journal of Materials Nanoscience*** **2022**, *9* (1), 3–12.
20) **Verma, G.†**; Kishnani, V. †; Pippara, R. K.; Yadav, A.; Chauhan, P. S.; Gupta, A. Highly Sensitive, Ambient Temperature CO Sensor Using Tin Oxide Based Composites. ***Sensors & Actuators A Physical*** **2021**, *332*, 113111. https://doi.org/10.1016/J.SNA.2021.113111. (*†Equal Co-authors)* ***(Q1; IF: 4.1)***

B. Peer Reviewed International Journals (Under Review)

21) **Verma, G.**; Kadiri, H.; Gokarna, A.; Nomenyo, K.; Lerondel, G.; Gupta, A; "Scalable Fabrication of Micro/Nanostructured Polymeric Functional Platforms via Advanced Lithography Techniques" ***(Under Review, 2025)***.

C. Peer Reviewed International Journals <u>not part of the Thesis</u> (Published)

1) Ghosh, A.; **Verma, G.**; Dolle, C.; Gupta, A.; Korvink, J. G.; Islam, M. et al. Enhanced Performance of Laser-Induced Graphene Supercapacitors via Integration with Candle-Soot Nanoparticles. ***ACS Applied Materials & Interfaces*** **2024**, *16* (31), 40313–40325. https://doi.org/10.1021/ACSAMI.4C07094 *(Q1; IF: 8.3)*
2) Ni, Y.; Gupta, A.; **Verma, G.**; Gupta, S.; Weidler, P. G.; Mager, D.; Korvink, J. G.; Islam, M. Preparation of Electrospun Porous Alumina Nanofibers for Origami-Inspired Manufacturing. ***Advanced Engineering Materials*** **2022**, *24* (12), 2201183. https://doi.org/10.1002/ADEM.202201183. *(Q1; IF: 3.4)*
3) Sheshkar, N.; **Verma, G.**; Pandey, C.; Sharma, A. K.; Gupta, A. Enhanced Thermal and Mechanical Properties of Hydrophobic Graphite-Embedded Polydimethylsiloxane Composite. ***Journal of Polymer Reserach*** **2021**, *28* (11), 1–11. https://doi.org/10.1007/S10965-021-02774-W. *(Q2; IF: 2.6)*
4) **Verma, G.**; Mondal, K.; Gupta, A. Si-Based MEMS Resonant Sensor: A Review from Microfabrication Perspective. ***Microelectronics Journal*** **2021**, *118*, 105210. https://doi.org/10.1016/J.MEJO.2021.105210. *(Q3; IF: 2.2)*

D. Patents

1) Biodegradable flexible platform with hierarchical nano-structured tubes for gas sensing application *(Indian Patent Filed).*
   Inventor: Gulshan Verma, Ankur Gupta, Prashanth Venkatesan, Suraj Barala, and Mahesh Kumar
2) In-channel nanowire growth for enhanced organic textile dye degradation in microreactors *(Indian Patent Filed).*
   Inventor: Gulshan Verma and Ankur Gupta
3) Metal organic framework (MOF) integrated membrane for low viscous oil removal *(Indian Patent Filed).*
   Inventor: Gulshan Verma and Ankur Gupta
4) Method of fabricating flexible and biodegradable Y_2O_3 based hybrid structured film *(Indian Patent Filed).*
   Inventor: Gulshan Verma and Ankur Gupta

E. Book (Published)

1) Gupta, A; **Verma, G.**, "Nanostructured Gas Sensors: Fundamentals, Devices, and Applications", by Jenny Stanford publishing, Jan 2023.

F. Book Chapters (Published)

1) **Verma, G.**, Gupta, A., & Bhattacharya, S. (2022). Internet of Things (IoT)-Assisted Gas Sensing Technology. In Gas Sensors (pp. 287-302). CRC Press.
2) **Verma, G.**, Gupta, A. (2022). Theoretical Studies of Nanomaterials-Based Chemiresistive Gas Sensor. In Gas Sensors. CRC Press.
3) **Verma, G.**, Gupta, A., & Bhattacharya, S. (2022). Electronic Nose: Pathway to Real-Time Gas Sensing Paradigm. In Gas Sensors. CRC Press.
4) **Verma, G.**, & Gupta, A. (2022) One-Dimensional Nanostructures for Gas Sensing Applications. In Gas Sensors (pp. 169-184). CRC Press.

G. Conference without proceeding *(*Presenting author)*

1) **Verma, G***; and Gupta, A; presented the poster titled "Parametric Analysis of semiconducting nanowires on flexible substrate for low temperature gas sensing application", International Conference on Functional Materials, IIT Kharagpur, 2024.
2) **Verma, G***; Gokarna, A; Kadiri, H; Nomenya, K; Lerondel, G; Gupta, A; presented the poster titled "Bio-Inspired Polymeric Functional Platform for Sensing Application", European Material Research Society (EMRS) 2023, Strasbourg, France.
3) **Verma, G***; and Gupta, A; presented the poster titled "Customizable 3D-Printed Microstructures Embedded with Ultrathin ZnO Nanowires", AM 3D Aero 2023 held at Ramaiah Institute of Technology, Bengaluru, India 13-14 December 2023.
4) **Verma, G**; and Gupta, A*; presented the oral talk on "Flexible Breath Sensor for Non-invasive Detection of Exhaled Diabetes Biomarker", 6th International Conference on Soft Materials (ICSM-2024), Tarragona, Spain, 17-20 November 2024.

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