Dr. Tumesh Kumar Sahu

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Lead Scientist, 9N Tech. London (UK))

Summary

Material Scientist with 8+ years of experience in advanced materials characterization, micro- and nanoscale failure analysis, and laboratory-based testing. Expertise in material behavior, defect evaluation, metallographic sample preparation, and mechanical characterization of metals, semiconductors, and 2D materials. Hands-on experience with optical microscopy, SEM, AFM, Raman, XRD, UV-Vis, and PL spectroscopy for structural, chemical, and surface analysis. Skilled in documentation, report preparation, and supporting continuous improvement of laboratory standards, QMS, and testing procedures. Highly detail-oriented with strong analytical, problem-solving, and team collaboration skills, focused on translating material insights into industrial applications.

Experience

Lead Scientist

9N Technology • London
03/2025 - Present

- Perform detailed material and surface failure analysis of micro- and nano-scale CMOS components, including metallographic cross-sectioning, defect evaluation, and identification of cracks, delamination, and structural failures using optical microscopy, AFM, SEM, Raman, and XRD. Support standardized testing procedures, maintain and calibrate laboratory instruments, assist in QMS improvements, and prepare accurate test/analysis reports in compliance with company documentation standards.

Operation Head, Product and R&D Manager

Multi Nano Sense Technologies Pvt. Ltd. • Nagpur, India
06/2025 - 10/2025

- Lead end-to-end ideation, development, testing, and commercialization of hydrogen, gas, and humidity sensors, providing technical leadership in sensor architecture, materials optimization, and device performance enhancement. Drive technology evaluation for advanced nanomaterial integration, align R&D, QA, and production for scalable manufacturing, ensure regulatory compliance and IP generation, mitigate technical risks, and mentor teams to foster innovation and excellence.

R&D Scientist

NanoMagnetics Instruments • Ankara, Turkiye
11/2023 - 04/2025

• Led design, assembly, integration, and testing of LT-SPM and NV-based microscopes, including MFM systems, cryogenic nanopositioners, piezo-driven nanostages, and vibration isolation, enabling high-resolution nanomaterial and semiconductor imaging with ~95% improved data reliability, defect detection, system stability, and signal-to-noise ratio. Collaborated with international clients and multidisciplinary teams, supported AFM/SEM/EDAX-based failure analysis, accelerated project delivery by ~70%, and contributed to next-generation nanoscale testing platforms, increasing uptime and experimental throughput by ~50%.

Assistant Professor

Shri Ramdeobaba College of Engineering and Management (RCOEM) • Nagpur,Maharastra
06/2022 - 11/2023

- Developed and taught nanotechnology and materials characterization courses.
- Co-led graphene–concrete composite research for thermal and structural performance enhancement.

Senior Research Fellow

Indian Institute of Technology • Patna, (India)

08/2018 - 11/2021

- Developed novel 2D-material-based AFM cantilevers and tips; synthesized and characterized graphene for sensors, FETs, photodiodes, supercapacitors, and graphene-based magnetoresistive devices. Designed and fabricated Graphene–GaN FETs on Si/SiO_2 with optimized contacts, performing I–V, transfer, and output characterization under high-field and thermal conditions to achieve CMOS-compatible FETs with fast switching, high breakdown voltage, and thermal stability.

Junior Research Fellow

IIT Patna • Patna
07/2016 - 08/2018

- Synthesized and functionalized graphene via CVD and Hummers' methods for gas sensing.
- Developed and optimized ammonia gas sensors using graphene thin films.

Junior Research Fellow

National Institute of Technology Raipur • Raipur, India
07/2015 - 07/2016

- Deposited and optimized ZnS and Cs:ZnS thin films via Chemical Bath Deposition.
- Characterized materials using XRD, SEM, AFM, and UV-Vis spectroscopy for solar cell applications.

Senior Research Fellow

Indian Institute of Technology Madras • Chennai, India
03/2014 - 07/2015

- Developed Sn-doped metal oxide thin films for transparent conducting oxide (TCO) applications in solar cells.
- Conducted advanced material characterization and performance optimization.

Education

PhD. Physics

Indian Institute of Technology • Patna,India
12/2021
CGPA 8.14

M.Tech. Physics

Indian Institute of Technology Madras • Madras, India
12/2014
CGPA 7.1

M.Sc. Physics

Pt Ravishankar Shukla University Raipur • Raipur
03/2011
67/100

B.Sc(Computer Science)

PT. Ravishankar Shukla University Raipur • Raipur
04/2009
67/100

Higher Secondary

Chhattishgarh Board of Secondary Education Raipur • Raipur
04/2006
72.8/100

Awards

GATE Physics 2011 AIR 98, CSIR NET 2011 AIR 197, Seniour Research Fellow , IIT Madras (2014-2015)

Publications & Reports

Publications:

1. Sahu, T.K., Sahu, S.P., Hembram, K.P.S.S. et al. Free-standing 2D gallium nitridefor electronic,excitonic, spintronic,piezoelectric, thermoplastic, and 6G wireless communication applications. NPG Asia Mater 15, 49 (2023). https://doi.org/10.103-8/s41427-023-00497-6

2. Sahu, T.K., Kumar, N., Chahal, S. et al. Microwave synthesis of molybdenene from MoS2. Nat.Nanotechnol. 18, 1430–1438 (2023). https://doi.org/10.1038/s41565-02-3-01484-2

3. Sahu, T.K., Ranjan, P., Bhushan, R., Yamijala, S.S., Late, D.J., Kumar, P. and Vinu, A., 2019.Freestanding borophene and its hybrids. Advanced Materials, 31(27),p.1900353.https://onlinelibrary.wiley.com/journal/15214095

4. Sahu, T. K., Motlag, M., Bandyopadhyay, A., Kumar, N., Cheng, G. J., & Kumar, P. (2022). 2+ δ-Dimensional materials via atomistic Z-welding. Advanced Science, 9(32), 2202695. https://doi.org/10.100-2/advs.202202695

5. Mishra, S., Sahu, T.K., Verma, P., Kumar, P. and Samanta, S.K., 2019. Microwave-assistedcatalytic degradation of

brilliant green by spinel zinc ferrite sheets. Acs Omega, 4(6), pp.10411-10418. https://doi.org/10.1021/Acsomega.9b00914

6. Sahu, T.K., Ranjan, P. & Kumar, P. Chemical exfoliation synthesis of boron nitride and molybdenum disulfide 2D

sheets via modified Hummers' method. emergent mater. 4, 645–654 (2021). https://doi.org/10.1007/s42247-021-00170-0

7. Chahal, S., Sahu, T.K., Kar, S., Ray, S.J., Biju, V. and Kumar, P., 2022. Transition metal-doped boron nitride atomic

sheets with an engineered bandgap and magnetization. The Journal of Physical Chemistry C, 126(49), pp.21084-

21093.https://doi.org/10.1021/acs.jpcc.2c06693

8. Ranjan, H., Ranjan, P., Sahu, T.K. et al. Reduced graphene oxide electrode-coatingas anticorrosive/anti-oxidative laminate for Al/Cu liquid-phase batteries. Journal of Materials Research 38, 1792–1802 (2023).

https://doi.org/10.1557/s43578-02-2-00814-9

9. Chahal, S., Sahu, T.K., Kar, S., Ranjan, H., Ray, S.J. and Kumar,P., 2024.Free-standing delta MnO2 atomic sheets.

Engineering Reports, 6(2), p.e12787.https://doi.org/10.1