Manish Kumar Tiwari

Roll No.:2006105001
Ph.D.
Metallurgical Engineering and Materials Science
Indian Institute Of Technology, Indore
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Education

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
Ph.D.	Indian Institute of Technology Indore	9.00 (Current)	2020-Present
M.Tech.	Indian Institute of Technology Indore	9.54	2020
B.Tech.	Lovely Professional University	8.78	2014
Senior Secondary	CBSE	73.4%	2009
Secondary	CBSE	78.8%	2007

Experience

- **Indian Institute of Technology Indore** *Oct. 2022 - Present*
  Senior Reserach Fellow - Department of Metallurgical Engineering and Materials Science IIT Indore, India
  – First Author Publications: 04, Gas Sensor
  – Co-author Publications: 11, Na-ion Batteries (4), Solar Cell (7)

- **Indian Institute of Technology Indore** *Aug. 2020 - Dec. 2024*
  Teaching Assistant - Department of Metallurgical Engineering and Materials Science IIT Indore, India
  – Composites Development Lab
  – Materials for Devices Lab

- **Indian Institute of Technology Indore** *Aug. 2020 - Oct. 2022*
  Junior Research Fellow - Department of Metallurgical Engineering and Materials Science IIT Indore, India
  – First Author Publications: 01, Gas Sensor
  – Co-author Publications: 02, Sodium-ion Batteries, Solar Cell

- **Indian Institute of Technology Indore** *Jul. 2018 - May 2020*
  Teaching Assistant - Department of Mechanical Engineering IIT Indore, India
  – Mechanical Workshop Lab
  – Lathe Machine Theory and Operation: Turning, Facing, Taper Turning etc.

Projects

- **Ph.D. Project: Advanced Functional Materials for Next Generation Gas Sensing Applications** *Aug. 2020 - Present*
  Supervisor: Prof. Parasharam M. Shirage Google Scholar
  – First Author Publications: 04
  – Co-author Publications: 11

- **M.Tech. Project: Fabrication and Characterization of Hybrid Solar Cell at Ambient Condition** *Jul. 2018 - May 2020*
  Supervisor: Prof. Parasharam M. Shirage
  – FTO/$c-TiO_2$/TiO_2 NRs/$CH_3NH_3PbI_3$/NiO/Au -based Solar cell
  – Perovskite Solar Cell

- **Capstone Project: Study of Mechanical Properties of Steel** *Aug. 2020 - Present*
  Supervisor: Mr. Amritpreet Singh Google Scholar
  – Effect on Mechanical Properties of EN8, EN24, EN31 and D3 steel
  – Heat treatment process: Annealing, Normalizing, Oil and Water Quenching

Research Skills

- **Synthesis of nanomaterials**: Hydrothermal method, Sol-gel method, Wet-chemical, Coating by RF/DC Sputtering, etc.
- **Analysis of different physical characterization methods**: P-XRD, FESEM, EDX, UV-Vis spectra, Raman Spectroscopy, AFM, BET/BJH Analysis, TGA, FTIR, HRTEM, XPS
- **Hands-on expertise with the Instruments**: P-XRD (RIGAKU SMARTLAB, BRUKER D2 PHASER), FE-SEM (JEOL JSM 7610F, Supra 55 ZEISS), UV-Vis spectrometer (Perkin Elmer Lambda 35), FTIR (Bruker), RF/DC Sputtering

Presentations/Workshop/FDPs/Seminars

- **Oral Presentation**: "IEEE Sensors Council" held at Indian Institute of Technology, Indore, India during 3rd-4th October, 2024. (Topic: $W_{18}O_{49}$ Nanofibers Functionalized with Graphene as a Selective Sensing of NO_2 gas at Room Temperature)
- **Oral Presentation**:"4th Ineternational Conference on Advanced Materials Synthesis, Characterisation and Applications-2024 (AMSCA-2024)" held at Queensland University of Technology, Brisbane, Australia during 25th-27th September, 2024. (Topic: NASICON-type $Na_3Fe_2(PO_4)_3$ Material for Ultra-Sensitive Room Temperature CO Gas Sensor)
- **Oral Presentation**:"Ineternational Conference on Advanced Materials Synthesis, Characterization and Applications (AMSCA Maverick-2022)", at Department of Physics, Savitribai Phule Pune University, Pune-07, Maharashtra, India, 18th-20th October, 2022. (Topic: Synthesis, characterization and sensing performance of NASICON-type $Na_3Fe_2(PO_4)_3$ for CO gas sensing at room temperature)
- **Workshop**: "Empowering Women in Sensor Technology (EWST'22)", IEEE Sensors Council, December 2022, IIT Indore
- **Workshop**: "Workshop on Sensors" organized by Indo-South Korea joint Network Center for Environmental Cyber Physical Systems- JNC Node1, November 2021, Department of Physics, IIT Roorkee jointly with IIT Indore and Gauhati University
- **Webinar**: "Nanotechnology Enabled Memristive Devices and Systems for Neuromorphic Computation and its Associate Applications", IEEE Nanotechnology Council (NTC), November 2021, IIT Indore

Publications

1. **M. K. Tiwari**, S. C. Yadav, A. Srivastava, A. Kanwade, J. A. K. Satrughna, S. S. Mali, J. V. Patil, C. K. Hong and P. M. Shirage, Enhancement of CO gas sensing performance by Mn-doped porous $ZnSnO_3$ microspheres, *RSC Adv.*, 2022, 12, 32249–32261. (**IF = 4.036**). DOI:10.1039/d2ra06785d
2. **M. K. Tiwari**, A. Kanwade, S. C. Yadav, A. Srivastava, J. A. K. Satrughna and P. M. Shirage, NASICON-type $Na_3Fe_2(PO_4)_3$ material for an excellent room temperature CO sensor, *J. Mater. Chem. C*, 2023, 11, 5469-5480. (**IF = 8.067**). DOI:10.1039/d3tc00300k.
3. **M. K. Tiwari**, S. C. Yadav, A. Kanwade, J. A. K. Satrughna, S. M. Rajore and P. M. Shirage, Advancements in lanthanide-based perovskite oxide semiconductors for gas sensing applications: a focus on doping effects and development, *Anal. Methods*, 2023, 15, 5754-5787. (**IF = 3.1**). DOI: https://doi.org/10.1039/D3AY01420G
4. **M. K. Tiwari**, A. Kanwade, S. M. Rajore, J. A. K. Satrughna, Y. Ito, H. Lee, Y. Ohshita, A. Ogura, S. S. Mali, J. V. Patil, C. K. Hong and P. M. Shirage, $W_{18}O_{49}$ Nanofibers Functionalized with Graphene as a Selective Sensing of NO_2 gas at Room Temperature, *ACS Appl. Mater. Interfaces*, 2024, 16, 49520-49532. (**IF = 8.3**). DOI: https://doi.org/10.1021/acsami.4c10014
5. A. Kanwade, S. Gupta, A. Kankane, **M. K. Tiwari**, A. Srivastava, J. A. K. Satrughna, S. C. Yadav and P. M. Shirage, Transition metal oxides as a cathode for indispensable Na-ion batteries, *RSC Adv.*, 2022, 12, 23284–23310. (**IF = 4.036**). DOI:10.1039/d2ra03601k
6. A. Srivastava, B. S. Chauhan, S. C. Yadav, **M. K. Tiwari**, J. A. K. Satrughna, A. Kanwade, K. Bala and P. M. Shirage, Performance of dye-sensitized solar cells by utilizing Codiaeum Variegatum Leaf and Delonix Regia Flower as natural sensitizers, *Chem. Phys. Lett.*, 2022, 807, 140087. (**IF = 3**). DOI:10.1016/j.cplett.2022.140087
7. A. Srivastava, J. A. K. Satrughna, **M. K. Tiwari**, A. Kanwade, S. C. Yadav, K. Bala and P. M. Shirage, Effect of $Ti(1-x)Fe_xO_2$ photoanodes on the performance of dye-sensitized solar cells utilizing natural betalain pigments extracted from Beta vulgaris (BV), *Energy Adv.*, 2023, 2, 148–160. (**IF = 3.31**). DOI:10.1039/d2ya00197g
8. A. S. Teja, A. Srivastava, J. A. K. Satrughna, **M. K. Tiwari**, A. Kanwade, S. C. Yadav and P. M. Shirage, Optimal processing methodology for futuristic natural dye-sensitized solar cells and novel applications, *Dye. Pigment.*, 2023, 210, 110997. (**IF = 4.15**). DOI:10.1016/j.dyepig.2022.110997
9. S. C. Yadav, **M. K. Tiwari**, A. Kanwade, H. Lee, A. Ogura and P. M. Shirage, Butea monosperma, crown of thorns, red lantana camara and royal poinciana flowers extract as natural dyes for dye sensitized solar cells with improved efficiency, *Electrochim. Acta*, 2023, 441, 141793. (**IF = 5.5**). DOI:https://doi.org/10.1016/j.electacta.2022.141793
10. J. A. K. Satrughna, A. Kanwade, A. Srivastava, **M. K. Tiwari**, S. C. Yadav, A. S. Teja and P. M. Shirage, Experimental and computational advancement of cathode materials for futuristic sodium ion batteries, *Mater. Today*, 2023, 65, 107371. (**IF = 21.1**). DOI: https://doi.org/10.1016/j.mattod.2023.06.013
11. A. Srivastava, J. A. K. Satrughna, **M. K. Tiwari**, A. Kanwade, S. C. Yadav, K. Bala and P. M. Shirage, Lead metal halide perovskite solar cells: Fabrication, advancement strategies, alternatives, and future perspectives, *Mater. Today Commun.*, 2023, 35, 105686. (**IF = 3.7**). DOI: https://doi.org/10.1016/j.mtcomm.2023.105686
12. A. S. Teja, A. Srivastava, J. A. K. Satrughna, **M. K. Tiwari**, A. Kanwade, H. Lee, A. Ogura and P. M. Shirage, Synergistic co-sensitization of environment-friendly chlorophyll and anthocyanin-based natural dye-sensitized solar cells: An effective approach towards enhanced efficiency and stability, *Solar Energy*, 2023, 261, 112-124. (**IF = 6**). DOI: https://doi.org/10.1016/j.solener.2023.06.004

13. A. S. Shaikh, S. C. Yadav, A. Srivastava, A. Kanwade, **M. K. Tiwari**, S. M. Rajore, J. A. K. Satrughna, M. Dhonde, and P. M. Shirage, Dynamic synergy of tin in the electron-transfer layer and absorber layer for advancing perovskite solar cells: a comprehensive review, *Energy Adv.*, 2024. (**IF = 3.2**). DOI: https://doi.org/10.1039/D4YA00204K
14. S. M. Rajore, A. R. Kanwade, J. A. K. Satrughna, **M. K. Tiwari**, and P. M. Shirage, A comprehensive review on advancements in catalysts for aluminum-air batteries, *J. Power Sources*, 2024, 616, 235101. (**IF = 8.1**). DOI: https://doi.org/10.1016/j.jpowsour.2024.235101
15. J. A. K. Satrughna, A. Kanwade, S. M. Rajore, **M. K. Tiwari**, Y. Ito, A. Ogura, H. Lee, Y. Ohshita and P. M. Shirage, Sol-gel based synthesis of high-capacity-$NaCoO_2$ cathode for advanced sodium-ion batteries, *Electrochim. Acta*, 2024, 507, 145201. (**IF = 5.5**). DOI: https://doi.org/10.1016/j.electacta.2024.145201
16. J. A. K. Satrughna, A. Kanwade, S. M. Rajore, **M. K. Tiwari**, Y. Ito, A. Ogura, H. Lee, Y. Ohshita, S. S. Mali, J. V. Patil, C. K. Hong, and P. M. Shirage, Unveiling the physicochemical and electrochemical features of sodium deficient-$Na_{0.8}Fe(SO_4)_2$ as cathode for sodium-ion batteries, *Next Research*, 2025, 100210. DOI: https://doi.org/10.1016/j.nexres.2025.100210

Research Interests

- **Sensors** : Sensor Technology, Environmental Monitoring Technologies
- **Energy Coversion Devices**: Perovskite Solar Cell, Dye-sensitized Solar Cell
- **Energy Storage Devices**: Sodium-ion Batteries, Li-ion Batteries

Key Courses Taken

- QIP Short-term Courses, AICTE
  - Materials Engineering from Synthesis to Applications, IIT Indore — Feb. 2022
  - Advanced Materials for Environmental Sensors, IIT Indore — March 2022
  - Synthesis and Characterization of Thin Films, IIT Indore — March 2022

Positions of Responsibility

- **Mentorship**: Mentored two B.tech. students for their B.Tech project on Gas Senor — Jul. 2024- Dec. 2024
- **Event Organizer**: International workshop on "Energy Conversion and Sustainable Future", Prof. Parasharam M. Shirage (Dept. of MEMS), IIT Indore, India. — 23-24 Jan. 2024
- **Event Organizer**: SERB sponsored KARYASHALA (High-End Workshop) on "Energy Materials Synthesis, Characterization, and Device Fabrication", IIT Indore, India. — 03-08 Jul. 2023
- **Resource person- Faculty Development Programme**:"Recent Development in Energy Materials for Sustainable Future" by ATAL AICTE organized by Indian Institute of Technology Indore, India. — 21 Nov.-01 Dec. 2022

Achievements

- **Senior Research Fellowship (SRF)**,Govt. of India — *2022-25*
- **Junior Research Fellowship (JRF)**,Govt. of India — *2020-22*
- **GATE 2018**,SCORE: 676 — *2018*

Academic/Professional References

1. Prof. Parasharam M. Shirage
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   Department of Metallurgical Engineering and Materials Science,
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   Indore - 453552, Madhya Pradesh, India.
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2. Prof. Mohan Lal Kolhe
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Declaration

I hereby declare that the above-mentioned information is correct to the best of my knowledge and I bear the responsibility for the correctness of the above-mentioned particulars.

Date:
Place: Indore, India