

# Omkar Mypati

Assistant Professor  
Mechanical Engineering  
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## ABOUT ME

I am a mechanical engineer who graduated from IIT Kharagpur (Dual BTech-MTech and PhD). My undergraduate specialisation was in Manufacturing Science. I am currently working as an Assistant Professor at IIT (ISM), Dhanbad, in the Department of Mechanical Engineering. For my doctoral thesis, I worked on solid-state welding/bonding of electronic components (Al-Cu tab and busbar) and experimental modelling/simulation of Li-ion batteries in the Friction Stir Welding laboratory at IIT Kharagpur. During my postdoctoral research fellowship, I investigated laser-assisted machining of hard-to-machine metal matrix composites (MMC) and machinability of fully sensor-integrated tools and their life prediction at the Rolls-Royce UTC, University of Nottingham. I have skills in welding/bonding, battery-pack modelling, artificial intelligence, and machine learning, laser-assisted MMC machining, sensor-integrated machining tools, graphene-based anodes, and molecular dynamic simulation.

## EDUCATION

- **Ph. D (2017-2022)**
  - Indian Institute of Technology Kharagpur, West Bengal, India
  - Topic: An experimental study and **molecular dynamic simulation** of friction stir spot welding of aluminium and copper for **battery pack applications**
- **Dual Degree (B. Tech + M.Tech) (2011-2016)**
  - Indian Institute of Technology Kharagpur, West Bengal, India
  - Degree: Manufacturing Science & Industrial Management, Department of Mechanical Engineering
  - Topic: B. Tech: Study of **ultrasonic-assisted friction stir welding** processes  
M. Tech: Applying **Lean and Six Sigma in the production** line at TVS Sundaram Fasteners Pvt. LTD
- **12<sup>th</sup> Class (2008-2010)**
  - Sri Chaitanya Junior College, Andhra Pradesh, India
- **10<sup>th</sup> Class (2007-2008)**
  - Sri Krishnaveni Talent School, Andhra Pradesh, India

## RESEARCH EXPERIENCE

### 1. University of Nottingham (Sep 2022-Mar 2025)

- **Position: Research Fellow**
- Topic: **Laser-assisted hard-to-machining** (Ti/Al-SiC fiber reinforced MMC) materials and **sensors integrated machining** tool for predicting tool life. Working under Prof. Zhirong Liao and Prof. Dragos Axinte.

### 2. Indian Institute of Technology Kharagpur (July 2016- July 2017)

- **Position: Junior Research Fellow**
- Topic: **Friction stir welding of aluminium and steel sheet** metals for automobile components. Worked under Prof. Surjya K Pal.

## RESEARCH INTERESTS

- Laser-assisted machining of MMCs
- Working on sensor-integrated tools
- Dissimilar metals joining, Micro thickness metals joining/bonding for Li-ion battery pack applications
- Molecular Dynamics Simulations for a manufacturing process
- Li-ion batteries simulation and modelling and testing, and Al-Air batteries

## OVERVIEW OF MY RESEARCH WORK

Scope / Solutions developed: Solid-state welding/bonding technique for Li-ion batteries; Laser-assisted milling of MMCs; Battery modelling, Intelligent manufacturing; Molecular dynamic simulations; Post-weld tests; Mechanical testing (Tensile, Fatigue, and microhardness) and metallurgical analysis (SEM, XRD, TEM, EBSD, AFM and XPS) and electrochemical characterization (Potential dynamic polarization, corrosion, electrostatic impedance spectroscopy, cyclic voltammetry, and charge-discharge testing, Electrical conductivity measurement (4-probe setup), and IMCs formation validation

- Graphene-based anode materials fabrication and testing
- Coating technology and its characterizations of weld joints in dissimilar material
- Implementation of AI/ML in the manufacturing process

## WELL VERSED IN

- Solid works (Machine design)
- Matlab (Signal processing)
- LAMMPS (MD simulation)
- Ansys (Li-ion battery simulation)
- LABVIEW (Data Acquisition)
- VESTA (Designing atoms/molecules)
- OVITO (Post-processing analysis of MD simulations)

## CERTIFICATIONS & OTHER SKILLS

- Six Sigma yellow belt (Amile Institute)
- Robot programming and control (KUKA-Friction stir welding)
- Blockchain Basics (Coursera)
- AI for everyone (Coursera)
- Teaching Assistantship (Welding, Forming, metrology lab) for undergraduate students
- Mentoring interns (simulation, AI/ML)

## RESEARCH COLLABORATIONS

1. University of Warwick, UK (Prof Prakash Srirangam)
2. University of Nottingham, UK (Prof Dragos Axinte, Dr. Z Liao)
2. University of Sheffield, UK (Dr Hassan Ghadbeigi)
3. University of Bath, UK (Dr Alborz Shokrani Chaharsooghi and Dr Ali Mohammadi)

## POSITION OF RESPONSIBILITY

- Committee member of Engineering Research Futures (ERF), University of Nottingham (2022- continuing)
- Member of Institute Innovation Council, IIT Kharagpur (2020-2022)
- Research Scholar representative of the Mechanical Engineering Department, IIT Kharagpur (2018-19)
- Technical coordinator at Dignity Samithi Trust (Reg: 101000398, dated 20th Nov 2019), Kharagpur, West Bengal (2019- continuing)

## AWARDS & SCHOLARSHIP

- Qualified for IIT Joint Entrance Examination and secured a 964 rank (2011) among 468,280 appeared for exam
- Qualified GATE with a score of 651 out of 1000 (2015)
- Recipient of Merit-Cum Means Scholarship
- Recipient of NCC Nation Cadet Corps 'C' & 'B' certificates from West Bengal Tech Air Squad NCC
- Bag various medals in Athletics, Hockey, Inter-hall Dramatics and Choreography

## INTERNSHIPS

- Mechanical Engineering Trainee, Dr.NTTPS (2014)
- Six Sigma application, quality check and control, TVS Sundaram Fasteners, Ltd. (2015)

## Supervision

**PhD Scholars:** 1 (Co-supervision)-ongoing

**MSc Students:** 2 (Completed)

## INTERNATIONAL PROJECT GRANTS

- **Multi-Process reconfigurable desktop production center for holistic 3D manufacture of micro-parts (ProDesk-3D) [1.944 million €]**

ProDesk-3D aims to develop and demonstrate a novel concept of a multi-processes and multi-axis "self-sufficient" desktop machine (DeskMach) that will make holistic processing of high precision full 3D micro-components possible with minimal human intervention. This will be addressed by adopting a series of complementary innovative concepts/approaches: i) reconfigurability of the ProDesk-3D is designed as "slot-in" facility units to which the 3D micro-part will be transferred for different operations – suitable to minimize part processing errors and idle manipulations. ii) hybrid parallel kinematic multi-axis (6+2) part positioner as "focal point" of the geometrical arrangement of "slot-in" facility posts – suitable compact configuration with low compound positioning errors. iii) "built-in" part & end-effector manipulation system by smart use of multi-axis positioner and optimal geometrical arrangement of "slot-in facility posts" – suitable in reducing the ancillaries and improving compactness of the ProDesk-3D system. iv) in-situ metrology and referencing systems for 3D micro-part and end-effectors for holistic process compliance – suitable in improving part processing accuracy and reduction of non-operational times

## RESEARCH PUBLICATIONS

### • PATENT

1. **Omkar Mypati**, Pavan Kumar Polkampally, Surjya Kanta Pal, Prakash Srirangam, "Graphene-induced high conductive friction stir spot welded aluminium and copper tabs for Li-ion batteries," File number: 202231006720 dated 08-02-2022
2. Sukrity Ghosh, **Omkar Mypati**, Surjya Kanta Pal, "An automated system for ***fuse box assembly inspection*** and fault detection and a method thereof," File number: 202331009507 dated 13-02-2023
3. Arun Kumar, **Omkar Mypati**, Surjya kanta Pal, "An automated system for ***printed circuit board inspection*** and fault detection and a method thereof," File number: 202331011502 dated 20-02-2023

### • INTERNATIONAL JOURNAL PAPERS

4. **Omkar Mypati**, Zhirong Liao, Shusong Zan, Rachid M'Saoubi, Dragos Axinte, Sub-surface sinking effect of reinforcement particle in laser assisted machining of metal matrix composites", CIRP Annals, 2025, <https://doi.org/10.1016/j.cirp.2025.04.041>, (SCI, IF=3.2)
5. **Omkar Mypati**, Jose A Robles-Linares, Shusong Zan, Dragos Axinte, Zhirong Liao , "Decoding physical sensor signals to reveal chip formation and surface deformation: An example in machining nickel-based superalloys" Mechanical Systems and Signal Processing, 2025, <https://doi.org/10.1016/j.ymssp.2024.112297>, (SCI, IF=7.9)
6. **Omkar Mypati**, Avishek Mukherjee, Debasish Mishra, Surjya Kanta Pal, Partha Pratim Chakrabarti, Arpan Pal, "A Critical Review on Applications of Artificial Intelligence in Manufacturing" Artificial Intelligence Review, Springer, 2021, <https://doi.org/10.1007/s10462-023-10535-y>, (SCI, IF=12)
7. **Omkar Mypati**, Polkampally Pavan Kumar, Perwej Iqbal, Surjya Kanta Pal, Prakash Srirangam, "Molecular dynamics simulation of atomic diffusion in friction stir spot welded Al to Cu joints," Mechanics of Advanced Materials and Structures, 2021, Taylor & Francis, [doi.org/10.1080/15376494.2021.1972188](https://doi.org/10.1080/15376494.2021.1972188), (SCIE, IF=4.03)
8. **Omkar Mypati**, Debasish Mishra, Suryakanta Sahu, Surjya K Pal, Prakash Srirangam, "A study on electrical and electrochemical characteristics of friction stir welded lithium-ion battery tabs for electric vehicles," Journal of Electronic Materials, 2020, Springer, [doi.org/10.1007/s11664-019-07711-8](https://doi.org/10.1007/s11664-019-07711-8), (SCI, IF=2.2)
9. **Omkar Mypati**, Tariq Anwaar, Desham Mitra, Surjya Kanta Pal, Prakash Srirangam, "Modelling and characterization of Al and Cu busbar during charging and discharging of Li-ion battery for EVs" Energy Applied Thermal Engineering, 2022, Elsevier, [doi.org/10.1016/j.applthermaleng.2022.119239](https://doi.org/10.1016/j.applthermaleng.2022.119239), (SCI, IF=6.465)
10. **Omkar Mypati**, Suryakanta Sahu, Surjya Kanta Pal, Prakash Srirangam, "An Investigation of the Effect of Intermetallic Compounds on the Mechanical and Electrical Properties of Friction Stir Welded Al and Cu Busbar for Battery Pack Applications," Materials Chemistry and Physics, 2022, Elsevier, [doi.org/10.1016/j.matchemphys.2022.126373](https://doi.org/10.1016/j.matchemphys.2022.126373) (SCI, IF=4.778)
11. **Omkar Mypati**, Rajwardhan MA Pawar, Iman Sengupta, Vyas Mani Sharma, Subhasish B Majumder, Surjya K Pal, Prakash Srirangam, "The Synthesis of Novel Porous Graphene Anodes for Fast Charging and Improved Electrochemical Performance for Lithium-ion Batteries," Energy Sources, Part A: Recovery, Utilization, and Environmental Effects, 2022, Taylor & Francis, [doi.org/10.1080/15567036.2022.2075990](https://doi.org/10.1080/15567036.2022.2075990), (SCI, IF=3.447)
12. **Omkar Mypati**, Abhijit Sadhu, Suryakanta Sahu, Debasish Mishra, Surjya K Pal, Shiv Brat Singh, Prakash Srirangam, "Enhancement of joint strength in friction stir lap welding between AA6061 and AISI 304 by adding diffusive coating agents", Proceedings of IMechE, Part B: Journal of Engineering Manufacture, 2018, Sage Publications, [doi.org/10.1177/0954405419838379](https://doi.org/10.1177/0954405419838379), (SCI, IF=2.759)
13. Rishabh Swarnkar, **Omkar Mypati**, Surjya K Pal. "Atomic diffusion kinetics in IMC formation: A molecular dynamic insight into a novel friction stir backward extrusion cladding process", Journal of Materials Processing Technology, 2025, Elsevier, <https://doi.org/10.1016/j.jmatprotec.2025.118799>, (SCIE, IF=6.7)
14. Suryakanta Sahu, **Omkar Mypati**, Surjya K Pal, Mahadev Shome, Prakash Srirangam, "Effect of weld parameters on joint quality in friction stir welding of Mg alloy to DP steel dissimilar materials," CIRP Journal of Manufacturing Science and Technology, 2021, Elsevier, [doi.org/10.1016/j.cirpj.2021.06.012](https://doi.org/10.1016/j.cirpj.2021.06.012), (SCIE, IF= 4.6)
15. Raju Prasad Mahto, Sharath Anishetty, Arnab Sarkar, **Omkar Mypati**, Surjya Kanta Pal, Jyotsna Dutta Majumdar, "Interfacial microstructural and corrosion characterizations of friction stir welded AA6061-T6 and AISI304 materials, Metal and Material International, 2018, Springer, [doi.org/10.1007/s12540-018-00222-x](https://doi.org/10.1007/s12540-018-00222-x), (SCI, IF= 3.642)

16. Abhijit Sadhu, Debapriya Patra Karmakar, **Omkar Mypati**, Gopinath Muvvala, Surjya K Pal, Ashish Kumar Nath, "Performance of additive manufactured Stellite 6 tools in friction stir processing of CuCrZr sheet", Optics and Laser Technology, Elsevier, 2020, doi.org/10.1016/j.optlastec.2020.106241, (SCI, IF= 4.939)
17. Abhijit Sadhu, Sagar Sarkar, Angshuman Chattopadhyay, **Omkar Mypati**, Surjya K Pal, Ashish Kumar Nath, "Effect of Laser Shock Peening on micro-structure and mechanical properties of Friction Stir Welded CuCrZr sheets." Material Science and Engineering: A, Elsevier, 2022, doi.org/10.1016/j.msea.2021.142238, (SCI, IF= 6.044)
18. **Omkar Mypati**, Surjya Kanta Pal, Prakash Srirangam, "Tensile and fatigue properties of aluminium and copper micro joints for Li-ion battery pack applications," Forces in Mechanics, 2022, Elsevier, doi.org/10.1016/j.finmec.2022.100101 (Scopus, IF=3.2)
19. **Omkar Mypati**, Polkampally Pavan Kumar, Surjya Kanta Pal, Prakash Srirangam, "TEM analysis and molecular dynamics simulation of graphene coated Al-Cu micro joint for Li-ion batteries," Carbon Trends, 2022, Elsevier, doi.org/10.1016/j.cartre.2022.100223, (Scopus, IF=3.1)
20. **Omkar Mypati**, Jeriel Panzer, Jose A Robles-Linares, Shusong Zan, Zhirong Liao, Dragos Axinte, "Modelling and Experimental Study of Laser-Assisted Milling of Fibre Reinforced SiC/Ti-6Al-4V Metal Matrix Composite," Materials and Design, 2024, Elsevier, <https://doi.org/10.1016/j.matdes.2023.112552> (SCI, IF= 8.4)
21. Abhijit Sadhu, **Omkar Mypati**, Ashish Kumar Nath, Surjya K Pal, "Performance Evaluation of Laser-Deposited Functionally Graded Stellite 6-WC Tools in Friction Stir Lap Welding of CuCrZr-SS304," Journal of Materials Engineering and Performance, 2024, Elsevier, <https://doi.org/10.1007/s11665-024-09980-9>, (SCIE, IF= 2.2)
22. Shusong Zan, Zhirong Liao, **Omkar Mypati**, Dragos Axinte, Rachid M'Saoubi, Mark Walsh, Jose A Robles-Linares, "Machining SiC fibre reinforced metal matrix composites – How do different matrix materials affect the cutting performance?," CIRP Annals, 2024, Elsevier, <https://doi.org/10.1016/j.cirp.2024.04.060> (SCI, IF= 4.1)

#### • INTERNATIONAL CONFERENCE PAPERS

23. **Omkar Mypati**, Surjya Kanta Pal, Prakash Srirangam, "A study on electrical conductivity of micro friction stir welded dissimilar sheets for hybrid electric vehicles (HEVs)," Electronic Materials, 2019, TMS Annual Meeting & Exhibition.
24. **Omkar Mypati**, Suryakanta Sahu, Surjya Kanta Pal, Prakash Srirangam, "Formation of Kamacite (Fe, Ni) to increase the mechanical strength of friction stir lap welding of aluminium to steel aided with coating," Asia Steel conference, 2019.
25. **Omkar Mypati**, Hakan Dogan, Jose A Robles-Linares, Alborz Shokrani, Zhirong Liao, "Chip Morphology Prediction in Inconel 718 Milling through Machine Learning-based Multi-Sensor Signal Analytics," CIRP, CSI, 2024.
26. Suryakanta Sahu, **Omkar Mypati**, Soumya Sangita Nayak, Pooja Sarkar, Surjya Kanta Pal, Shiv Brat Singh, "Friction Stir Welding for Joining of Dissimilar Materials," Advances in Additive Manufacturing and Joining, 2020.
27. Thomas Girerd, **Omkar Mypati**, Marco Simonelli, Andres Gameros, Andy Norton, Adam Clare, "Laser Mesh Cladding: a new approach to laser DED as a repair technology", LANE, 2024.

I hereby declare that all the above information is correct and accurate to the best of my knowledge.

(Omkar Mypati)