

DR ATOSH KUMAR SINHA, PhD

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CAREER OBJECTIVE

Actively looking for a research position in the industries. I have strong academic background, hands-on-experience in additive manufacturing of aerospace grade material, and have interest in sustainable materials and manufacturing process. I am focused on advancing fabrication processes, enhancing material properties, and fostering novel industrial applications. I am also looking for interdisciplinary research opportunity.

EDUCATION

Doctor of Philosophy (PhD), Metallurgical and Materials Engineering

July 2019 – October 2024

National Institute of Technology Durgapur

Dissertation: *Studies on Wire Arc Additive Manufacturing of High Strength Aluminium alloys: Process Parameters – Structure – Property Correlation (Defended on 3rd October 2024).*

Master of Technology (M. Tech), Mechanical Engineering (Specialization: Manufacturing Technology)

July 2016 – May 2018

National Institute of Technology Agartala

CGPA: 8.47

Dissertation: *Development of Composite using Wood Waste and Polymer for Industrial Purpose.*

Bachelor of Technology (B. Tech), Mechanical Engineering

August 2010 – June 2014

JIS College of Engineering

DGPA: 7.70

Project: *Dual Tone Multi-Frequency (DTMF) Controlled Robot.*

KEY SKILLS

Technical: Corrosion Testing (Electrochemical Impedance Spectroscopy, Polarization Studies), Additive Manufacturing, Advanced Materials Characterization (SEM, TEM, XRD), Simulation.

Research and Analytical Skills: Process Optimization, Microstructural Analysis, Thermal and Mechanical Property Evaluation, Machine Learning Applications in Material Science.

Programming and Software: Python, MATLAB, ANSYS, SolidWorks, AutoCAD, Minitab, JMP Pro.

Communication: Scientific Writing, Technical Presentations, Report Preparation.

Languages: English (Fluent), Bengali (Fluent), Hindi (Fluent).

RESEARCH EXPERIENCE

Doctoral research

- Investigated process parameters and microstructure-property relationships in WAAM (Wire Arc Additive Manufacturing) of high-strength aluminum (2319) alloys.
- Investigated the effect of cooling strategy (air and water cooling), interlayer time interval on evolution of solidification structure and correlated with corresponding mechanical properties.
- Minimizing the non-homogeneous solidification structure of WAAM deposits by reinforcing ceramic particles at the interlayer and post deposition aging treatment. Study the correlation of microstructural and mechanical properties.
- Predicted temperature evolution for single and multi-layer WAAM deposit using finite element method (ANSYS) and validated with experimental data.

M. Tech research project

- Focused on the development and analysis of Polymer Matrix Composite (PMC). PMCs were fabricated using micro-sized (60, 110 and 120µm) bamboo particles as reinforcement and epoxy resin as matrix in three different weight ratios (60:40, 50:50, and 40:60).
- Investigated the physical (water absorption, swelling), microstructural (Optical and SEM), phase and composition (EDX and FTIR), and mechanical properties (tensile strength and hardness).

Other research projects

- Investigated the effect on microstructural and corresponding mechanical properties due to addition of aloe-vera, SiC and MoS₂ at the interlayer of the steel WAAM deposits.
- Employed cryogenic treatment, cryogenic heat-treatment and heat-treatment on powder particle reinforced WAAM (aluminium and steel) deposits and investigated the effect on microstructural and mechanical properties.
- Investigated the effect on corrosion resistance properties of powder particle added, cryogenic treated, cryogenic heat-treated and heat-treated WAAM (aluminium and steel) deposits.

RESEARCH INTEREST

- Advanced materials processing, process optimization, interdisciplinary research.
- Process parameters – Structure – Property relationships of materials.
- Corrosion, Renewable Energy Materials and Fuel Cell Technology

PUBLICATIONS

Published

1. **A. K. Sinha**, V. Sreeja and K. P. Yagati, “*Influence of aloe-vera powder addition on microstructure and mechanical properties of wire + arc additively manufactured ER70S-6 steel*”, Materials Letters. 375 (2024) 137230, <https://doi.org/10.1016/j.matlet.2024.137230>.
2. **A. K. Sinha** and K. P. Yagati, “*Wire Arc Additive Manufacturing of Al-Cu Alloy-Grain Refinement, Strengthening and Thermal Simulation*”, Silicon, 16 (2023) 441 – 461, <https://doi.org/10.1007/s12633-023-02667-1>.
3. **A. K. Sinha**, S. Pramanik, and K. P. Yagati, “*Effect of interlayer time interval on GTAW based wire arc additive manufacturing of 2319 aluminium alloy*”, Sādhanā. 48 (2023) 122, <https://doi.org/10.1007/s12046-023-02183-3>.
4. **A. K. Sinha**, S. Pramanik, and K. P. Yagati, “*WAAM of Al–Cu Alloy: Effect of Cooling and Remelting on Grain Size and Mechanical Properties*”, Transactions of the Indian Institute of Metals, 76 (2023), 1331-1339, <https://doi.org/10.1007/s12666-022-02857-2>.
5. **A. K. Sinha**, S. Pramanik and K. P. Yagati, “*Research progress in arc based additive manufacturing of aluminium alloys – A review*”, Measurement, 200 (2022) 111672, <https://doi.org/10.1016/j.measurement.2022.111672>.

Communicated

6. **A. K. Sinha**, S. Pramanik, and K. P. Yagati, “*Solidification structure transformation and strengthening of wire and arc additively manufactured Al-Cu alloy single wall multi-layered deposits*” (Under review – Materials Science and Technology)
7. **A. K. Sinha** and K. P. Yagati, “*Effect of Wire Arc Additive Manufacturing Process Parameters on Al-Cu alloys and property prediction by Random Forest Regression and Artificial Neural Network*” (Under review – Journal of Manufacturing Processes)
8. **A. K. Sinha** and K. P. Yagati, “*Optimization of WAAM Process Parameters of TiC and TiB₂ reinforced Al-Cu composites and property prediction by Artificial Neural Network*” (Under review – Journal of Manufacturing Processes)
9. **A. K. Sinha** and K. P. Yagati, “*Investigation of SiC powder particle addition on Microstructural, Mechanical and Corrosion behaviour of WAAM processed ER70S-6 steel*” (Under review – Silicon)

Conferences

1. **A. K. Sinha**, S. Pramanik, and K.P. Yagati, “*Intermetallic Effect on the WAAM of 2319 Al-alloy*”, ICOFT – Made, December 14 – 16, 2022, NIT Puducherry.
2. R. K. Nath, P. Maji, **A. K. Sinha**, R. Karmakar, P. Paul, “*Effect of different electrode angle as well as weld direction on the bead geometry of Submerge Arc Welding Process*”, RASM, July 29 – 30, 2021, A.J. Institute of Engineering and Technology, Published in Materials Today: Proceedings, 49 (2022) 1793 – 1798.
3. **A. K. Sinha**, S. Ranjan, and K.P. Yagati, “*Effect on microstructure and mechanical property of 4043 wire arc additively manufactured aluminum alloy with different process parameters*”, RDMPMC, 26 – 27th August 2020, Published in Next Generation Materials and Processing Technologies: Select Proceedings of RDMPMC 2020, 171 – 184, 2021.
4. **A. K. Sinha**, R. K. Nath, J.D. Barma, and M. Saha, “*Development of composites using bamboo waste and polymers for industrial application*”, RDMPMC, 26 – 27th August, 2020, Published in Next Generation Materials and Processing Technologies: Select Proceedings of RDMPMC 2020, 41 – 51.

PROFESSIONAL EXPERIENCE

Teaching Assistant

July 2019 – October 2024

National Institute of Technology Durgapur

- Developed class materials and supervised graduate and undergraduate research projects.
- Conducted laboratory sessions, provided guidance on experimental techniques, and assisted in official duties during academic assessments

ACADEMIC ACHIEVEMENTS

1. Qualified GATE (Graduate Aptitude Test in Engineering) in Mechanical Engineering (2014, 2016).
2. Awarded Ministry of Education Fellowship during PhD and MTech programs.

REFERENCES

1. Prof. Krishna Priya Yagati

Assistant Professor, Department of Metallurgical and Materials Engineering

National Institute of Technology Durgapur

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2. Prof. John Deb Barma

Professor, Department of Mechanical Engineering

National Institute of Technology Agartala

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Declaration

I hereby declare that the information furnished above is true to the best of my knowledge.



ATOSH KUMAR SINHA