

CURRICULUM VITAE

PERSONAL DETAILS



Last Name: Dhal

First Name: Abhijeet

Date of CV: 30th June 2026

Email: dhal.abhi@gmail.com

Researcher ID: [ORCID](#), [LinkedIn](#), [Google Scholar](#)

WORK EXPERIENCE

Jun 2026 – present: Postdoctoral Research Associate, Material Science and Environmental Engineering, Tampere University, Finland

Host: [Asst. Prof. Gaurav Mohanty, Mechanical Behavior of Engineering Materials](#)

- Micromechanism of novel high strength and high temperature materials, materials for extreme applications.

Nov 2024 – Feb 2026: Assistant Research Scientist, Hopkins Extreme Materials Institute (HEMI), Johns Hopkins University, USA

Host: [Prof. Timothy Rupert, Professor and Director, HEMI](#)

- Technical lead on an NSF-funded project on development of near-ideal-strength Al-based alloys; responsible for experimental strategy, milestone planning, reporting, and mentoring of a graduate researcher. Developed a novel high strength Al-Ni-Mo alloy by using order-disorder transformation.
- Core team member of an ARPA-E project processing and nanomechanical testing of complexion-engineered nanostructured W-alloys for plasma-facing components in fusion reactors.
- Designed, fabricated and commissioned Joule heating based rapid processing and testing system with active cooling mechanism (rate = 500 °C/s), high temperature capability upto 1500 °C under vacuum (10^{-7} Torr), expanding HEMI's experimental capability for extreme conditions.

Feb 2021 – Nov 2024: Postdoctoral Research Associate, University of North Texas, Denton, USA

Host: [Prof. Rajiv Mishra, Regent Professor, Materials Science and Engineering](#)

Task 1: Multiscale testing and characterization at extreme conditions

- Three years of hands-on experience in a wide range of nanoindentation technique using FemtoTools FT-NMT04 + HT04 *in-situ* system. Initiated nanomechanical research in the group. Primary equipment manager providing training to other end-users, SOP preparation, periodic maintenance, upgradation, compliance check and calibration.
- **SEM *in-situ* extreme condition nanoindentation** quasi-static to high-strain (10^{-3} to 10^3 /s) and room temperature to 800 °C for site specific incipient plasticity, phase transformation, work hardening behavior with respect to grain size, crystal orientation and interfaces in metastability-engineered transformative high entropy alloys (TRIP-HEA).

- **SEM *in-situ* nanoindentation fracture study** for precise assessment of deformation behavior at small scale and root cause failure analyses of W-NbC cermet, and for ductile-brittle-transition deformation response of novel W-rich refractory alloys by testing over a wide temperature and strain-rate range.
- **Micromechanically guided multiscale study** of TRIP-HEA and additively manufactured alloys. Integration of experimental micromechanical datasets with physics-based solidification model, layer-wise thermal history, and machine learning for high-throughput multiscale chemistry-processing-structure-property correlation.
- **Focused ion-beam (FIB) micromachining:** Certified in FEI Nova NanoLab FIB-SEM for of micro-pillar and TEM lamellas. Trained in Thermo-Fischer Helios 5 CXe Plasma FIB-SEM.

Task 2: Alloy design, heat treatment, and material processing

- Alloy design of novel high strength Al-alloy for additive manufacturing using CALPHAD. The developed Al-Ni-Zr-Ti-Mn alloy demonstrated remarkable strength of 502 MPa.
- Friction-stir processing and heat-treatment of high-strength Al alloys, TRIP-HEA, and Ti-alloys.

Task 3: Publication, proposal writing and project reporting

- Quarterly technical reports for federal funded projects (ARL, ONR, and NASA), grant proposal; writing under the supervision of host professor.
- Publication of results in peer reviewed journals (9 published from UNT activities) and conference presentation. Brainstorming with group members for new ideas and mentoring of Ph.D. scholars (5 papers published by 4 Ph.D. scholars under the mentorship).

Sep 2019 – March 2020; Sep 2020 – Feb 2021: Project Officer, Center for Industrial Consultancy and Sponsored Research, Indian Institute of Technology (IIT) Madras, Chennai, India

- Managed a two-years long government-industry-academia consortium project titled IMPRINT under the joint-mentorship of PI at IIT Madras and industry leaders.
- Coordinated establishment of new thermomechanical processing laboratory at IIT Madras.
- Development of a novel hybrid manufacturing route for processing bulk nanostructured bimetallic thin sheets for electrical industries and patented a microforming tool with integrated heating system.
- Managing project milestones and technology readiness level assessment. Publication of fundamental research in papers.

EDUCATION

July 2012-Sept 2019: Masters (M.S.) and Ph.D.: Mechanical Engineering (Specialization: Manufacturing), Indian Institute of Technology Madras, India

Thesis: Microformability of aluminum alloys with engineered coarse to ultrafine grained microstructures

Supervisor(s): Prof. M.S. Shunmugam, Prof. S.K. Panigrahi

June 2009-March 2012: Bachelor of Technology (B.Tech): Manufacturing Science and Technology, University College of Engineering, India

FUNDING & PROJECT MANAGEMENT EXPERIENCE

- **NSF Project (Grant 2310307):** Technical Lead, development of near-ideal strength Al alloys.
- **ARPA-E Fusion Materials Project (DE-FOA-0003240):** Contributor; development of complexion-engineered nanocrystalline tungsten alloys.
- **US Army Research Laboratory Additive Manufacturing Project (W911NF-19-2-0011):** Contributor; additive manufacturing of high-performance alloys.
- **Department of Defense TRIP-HEA Project (W911NF-18-2-0067):** Contributor; high-strain-rate deformation of advanced alloys.

Proposal development contributions:

- NSF collaborative proposal (Penn State University)
- ARL proposal on high-throughput materials discovery for extreme environments
- NASA Advanced Materials, Structures and Manufacturing proposal
- NIST collaborative proposal on nanomechanics

SUPERVISION & PROFESSIONAL SERVICES

PhD Researchers:

- [Prithvi Awasthi \(Ph.D., May 2024\)](#)
- [Anurag Gumaste \(Ph.D., December 2024\)](#)
- Ankita Roy (Ph.D., January 2026)
- Aishani Sharma (Ph.D., January 2026)

Graduate Students:

Mentored 2 students on nanomechanical test projects (2024), and Al alloy project in (2025).

TEACHING EXPERIENCE

Guest Lecture - IIT Gandhinagar (March-April 2026)

Course: Material design and testing for extreme applications (20 contact hours)

Course Lecture - University of North Texas (2022)

Topic: Introduction to contact mechanics and nanoindentation (2 lectures)

ACADEMIC CITIZENSHIP

Peer reviewer for international journals:

Materials Science & Engineering A, JOM, Advanced Engineering Materials, International Journal of Advanced Manufacturing Technology, Journal of The Institution of Engineers (India): Series C

Total review completed = 53.

Professional Society Membership:

Member - The Minerals, Metals & Materials Society (TMS)

Member - Shaping and Forming Committee, TMS Materials Processing & Manufacturing Division

SKILLS AND PROFICIENCY

Experimental Skills:

- **Material processing:** Additive manufacturing (L-DED, L-PBF, AFSD), Solid state processing (FSP/W, ARB, cryorolling, asymmetric rolling), heat treatment, powder metallurgy (SPS, sintering, ball milling).

- **Microstructure characterization:** SEM, EBSD, EDS, XRD-GIXRD, DSC, TEM (BF, DF, STEM, HAADF-EDS, WBDF), ct-XRM, FIB (micro-specimen milling, TEM lift-outs).
- **Nano/micro-mechanical testing:** *in-situ* SEM and *ex-situ* nanomechanical testing, high temperature nanoindentation.
- **Macro-mechanical testing:** tensile, compressive, 3-point bending with digital image correlation, high-strain rate testing using Split-Hopkinson pressure bar compression.

Computational skills:

- **CALPHAD:** ThermoCalc.
- **CAD modelling:** Creo, Solidworks, AutoCAD, **Finite Element Modelling:** ABAQUS.
- **Numerical analysis and graphing:** Python, Matlab, OriginPro.
- **Microstructure analysis:** TSL-OIM, XPert HighScore Plus, CrystalMaker.

Language skills:

- English (Professional level reading, writing and speaking proficiency).
- Hindi and Odia (native).

AWARDS AND ACCOMPLISHMENTS

- Best Poster Award, MCP Annual Meeting, Johns Hopkins University (2025).
- Certificate of Appreciation in Peer Review, Journal of The Institution of Engineers: Series C (2024).
- JOM Editor's Choice & Top 5% Article, TMS (2023).
- Support for Sustaining for Research grant, IIT Madras (2020).
- Best poster presentation, ASM HT&SE (2019).
- Institute Research Scholar Award, IIT Madras (2017).
- Alumni Travel Grant, IIT Madras (2016).

RESEARCH OUTPUT

Total peer-reviewed papers = 29; h-index = 14, i10 index = 15, Total citations = 614

Peer-reviewed scientific articles

Journal articles (reverse chronological order):

1. S. Mukherjee, A. Gumaste, P. Agrawal, A. Sharma, **A. Dhal**, R.S. Haridas, R. S. Mishra; Additive friction stir deposition of Fe-Cr-Ni transformative alloy, **Materials & Design**, 2025 ([link](#)).
2. R. Jain, R.S. Haridas, P. Awasthi, **A. Dhal**, R.S. Mishra; Evading strength-ductility trade-off in a metastability engineered layered metallic composite, **Materials & Design**, 2025 ([link](#)).
3. D. Mishra, **A. Dhal**, X. Li, S. Guo, R.L. Narayan, R.S. Mishra, J. Singh, S.S. Nene; Phase separation induced heterostructure promotes strength-ductility synergy in Cu-rich compositionally complex alloy in as-cast state, **Material Today Communication**, 2025 ([link](#)).

4. *A. Dhal*, S. Mukherjee, R. Jain, R.S. Haridas, R.S. Mishra; Decoding deformation-induced phase transformation in a high entropy alloy via nanoindentation pop-in phenomenon, **Materials Research Letters**, 2025 ([link](#)).
5. P. Awasthi, *A. Dhal*, M. Fredrick, R.S. Mishra; Near Crack Free Additive Manufacturing of a Novel W-Nb-C Alloy; **Material Research Letters**, 2024 ([link](#)).
6. A. Roy, *A. Dhal*, C. Mock, B.A. McWilliams, K.C. Cho, R.S. Mishra; Deciphering mechanical heterogeneity of additively manufactured martensitic steel using high throughput nanoindentation combined with machine learning, **Additive Manufacturing**, 2024 ([link](#)).
7. *A. Dhal*, S. Thapliyal, P. Agrawal, A. Sharma, A. Roy, R.S. Mishra, E. Faierson; Multimodal and multiscale strengthening mechanisms in Al-Ni-Zr-Ti-Mn alloy processed by laser powder bed fusion additive manufacturing, **Materials & Design**, 237, 112602, 2024 ([link](#)).
8. A. Roy, *A. Dhal*, R. Jain, P. Agrawal, S. Mukherjee, B.A. McWilliams, C. Mock, K.C. Cho, R.S. Mishra; Heterogenous phase evolution and mechanical response in additively manufactured low alloy martensitic steel processed via laser-directed energy deposition, **Materials & Design**, 243, 2024 ([link](#)).
9. A. Sharma, *A. Dhal*, A. Gumaste, S. Gaddam, R.S. Haridas, B.A. McWilliams, K.C. Cho, R.S. Mishra; Synergistic enhancement of strength and ductility in novel solid-stir continuous extrusion: influence of heterogeneous microstructure and alloy chemistry, **Material Science and Engineering A**, 901, 2024 ([link](#)).
10. P. Agrawal, *A. Dhal*, Z. Hu, M. Dubey, L. Shao, R. Prabhakaran, R.S. Mishra; Irradiation-induced shift in the thermodynamic stability of phases and the self-healing effect in transformative high entropy alloys, **Journal of Nuclear Materials**, 155093, 2024 ([link](#)).
11. B. Prathyusha, *A. Dhal*, S.K. Panigrahi; Achieving excellent bond strength and tensile strength synergy of ultrafine-grained Al/Cu bimetallic sheets developed by an innovative hybrid manufacturing process, **Journal of Material Processing and Technology**, 2024 ([link](#)).
12. A. Gumaste, *A. Dhal*, P. Agrawal, R.S. Haridas, V.K. Vasudevan, D. Weiss, R.S. Mishra; A novel approach for enhanced mechanical properties in solid-state additive manufacturing by additive friction stir deposition using thermally stable Al-Ce-Mg alloy, **JOM**, 208, 1-14, 2023 ([link](#)).
13. *A. Dhal*, R.S. Haridas, P. Agrawal, S. Gupta, R.S. Mishra; Mapping hierarchical and heterogeneous micromechanics of a transformative high entropy alloy by nanoindentation and machine learning augmented clustering, **Materials & Design**, 230, 111957, 2023 ([link](#)).
14. P. Agrawal, S. Gupta, *A. Dhal*, R. Prabhakaran, L. Shao, R.S. Mishra; Irradiation response of innovatively engineered metastable TRIP high entropy alloy, **Journal of Nuclear Materials**, 574, 154217, 2023 ([link](#)).
15. R.S. Haridas, P. Agrawal, S. Thapliyal, P. Agrawal, *A. Dhal*, S. Shukla, L. Zhou, L. Sohn, R.S. Mishra; Synergy of tensile strength and high cycle fatigue properties in a novel additively manufactured Al-Ni-Ti-Zr alloy with a heterogeneous microstructure, **Additive Manufacturing**, 62 (103380), 2023 ([link](#)).
16. *A. Dhal*, S.K. Panigrahi, M.S. Shunmugam; A comprehensive study on size-effect, plastic anisotropy and microformability of aluminum with varied alloy chemistry, crystallographic texture, and microstructure, **Material Science and Engineering A**, 876, 2023 ([link](#)).

17. **A. Dhal**, P. Agrawal, R.S. Haridas, S. Gaddam, A. Sharma, D. Parganiha, R.S. Mishra, H. Kawanaka, S. Matsushita, Y. Yasuda, S.H.C. Park, W. Yuan; High-throughput investigation of multiscale deformation mechanism in additively manufactured Ni superalloy, **Metals**, 13 (420), 1-17, 2023. (*Invited paper*) ([link](#)).
18. P Agrawal, R.S Haridas, S. Yadav, S. Thapliyal, **A. Dhal**, R.S. Mishra; Additive friction stir deposition of SS316: effect of process parameters on microstructure evolution, **Material Characterization**, 195, 2022 ([link](#)).
19. B. Prathyusha, **A. Dhal**, S.K. Panigrahi; An innovative solid state manufacturing approach for developing high performance Al/Cu bimetals, **CIRP Journal of Manufacturing Science and Technology**, 39, 359-371, 2022 ([link](#)).
20. **A. Dhal**, S Thapliyal, S Gaddam, P Agrawal, RS Mishra; Multiscale hierarchical and heterogeneous mechanical response of additively manufactured novel Al alloy investigated by high-resolution nanoindentation mapping, **Scientific Reports** 12 (1), 18344, 2022 ([link](#)).
21. **A. Dhal**, B. Prathysha, R Kumar, S.K Panigrahi; Twin evolution and work-hardening phenomenon of a bulk ultrafine grained copper with high thermal stability and strength-ductility synergy, **Material Science and Engineering A**, 802, 140622, 2021 ([link](#)).
22. **A. Dhal**, S.K. Panigrahi, M.S. Shunmugam; Achieving excellent microformability by engineering a unique ultrafine-grained microstructure”, **Scientific Reports**, 9, 2019 ([link](#)).
23. B. Srinivas, **A. Dhal**, S.K. Panigrahi; A mathematical prediction model to establish the role of stacking fault energy on the cryo-deformation behavior of FCC materials at different strain levels, **International Journal of Plasticity**, 97, 159-177, 2017 ([link](#)).
24. **A. Dhal**, S.K. Panigrahi, M.S. Shunmugam; Insight into the microstructural evolution during cryo-severe plastic deformation and post-deformation annealing of aluminum and its alloys, **Journal of Alloys Compounds**, 726, 1205-1219, 2017 ([link](#)).
25. **A. Dhal**, S.K. Panigrahi, M.S. Shunmugam; Influence of annealing on strain hardening behavior and fracture properties of a cryorolled Al 2014 alloy, **Material Science and Engineering A**, 645, 383–392, 2015 ([link](#)).
26. **A. Dhal**, S.K. Panigrahi, M.S. Shunmugam; Precipitation phenomena, thermal stability and grain growth kinetics in an ultra-fine-grained Al 2014 alloy after annealing treatment, **Journal of Alloys Compounds**, 649, 229-238, 2015 ([link](#)).

Chapters in research books:

27. **A. Dhal**, S.K. Panigrahi, M.S. Shunmugam; Deformation behaviour and fracture mechanism of ultrafine-grained aluminium developed by cryorolling, Strengthening and Joining by Plastic Deformation, Part of the book series: Lecture Notes on Multidisciplinary Industrial Engineering, Springer, Singapore ([link](#))

Conference proceedings:

28. **A. Dhal**, S.K. Panigrahi, M.S. Shunmugam; Investigation into the micro deep drawing capabilities of a specially engineered refined aluminium alloy, MATEC Web of Conferences 190, 10001, 2018. ([link](#))
29. **A. Dhal**, S.K. Panigrahi, M.S. Shunmugam; Influence of alloy chemistry on the deformation behaviour and anisotropic properties of aluminium ultra-fine-grained thin sheets, Journal of Physics: Conference Series 1063 (1), 012067, 2018. ([link](#))

Non-refereed scientific articles

A. Dhal, S.K. Panigrahi, M.S. Shunmugam; Development and characterization of fine-grained aluminium for micro sheet metal forming operation, Proceedings of 6th International and 27th All India Manufacturing Technology, Design and Research Conference, ISBN: 978-93-86256-27-0, 2016

Instrument/Technology Development

- A micro deep drawing apparatus with integrated heating capable of microforming challenging materials (**Patented, IN Patent 404, 689**) ([link](#)).
- Ultra-high-temperature platform enabling rapid processing and mechanical testing of high-temperature materials up to 1500 °C under vacuum (10^{-7} Torr).

Conference presentations

- Mapping nanoscale origin of superior mechanical properties of W- rich alloy processed by LPBF-AM, **TMS Annual Meeting**, March 2025, Las Vegas, Nevada, USA.
- Micromechanical Study of Microstructurally Heterogenous and Hierarchical Additive Manufactured Material Using High-resolution Nanoindentation Mapping, **TMS Annual Meeting**, February 2022, Anaheim, California, USA.
- Investigation into the micro deep drawing capabilities of a specially engineered refined aluminum alloy, **5th International Conference on New Forming Technology (ICNFT)**, September 2018, Bremen, Germany.
- Influence of alloy chemistry on the deformation behavior and anisotropic properties of aluminum ultra-fine-grained thin sheets, **11th International Conference and Workshop on Numerical Simulation of 3D Sheet Metal Forming Processes (NUMISHEET)**, August 2018, Tokyo, Japan.
- Bending deformation behavior of ultra-fine-grained aluminum sheets in micro-domain, **7th International Conference on Nanomaterials by Severe Plastic Deformation (NanoSPD)**, July 2017, Sydney, Australia.