

Aniket Kumar Dutt

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Highlights

- 5 years of experience on metal additive manufacturing
- 5 years of experience working different computational tools Comsol and Thermo-Calc
- 7 years of experience working of programming in C and Matlab to design the Materials
- 7 years of working experience on Integrated Computational Materials Engineering for designing of advanced industrial application alloys including Ni-based. Steel and Aluminum alloys
- 2 years of experience on digital content development for school students in the field of materials and metallurgy
- 7 years of working experience on Friction stir welding and processing of Titanium, Steel and Aluminum alloys
- 10 years of experience with mechanical and chemical polishing
- 2 years of experience working on electro-polishing, ion milling, dimple grinding, TEM, 3D atom probe sample preparation using focused ion beam (FIB)
- 5 years of experience working on materials characterization techniques including Optical, XRD and SEM
- 2 years of experience working on materials characterization techniques FIB, EBSD, TEM and 3D atom probe

Education

- PhD, Materials Science and Engineering, University of North Texas, USA, Spring 2017
Advisor: **Prof. Rajiv Mishra** *GPA: 4.0/4.0*
- M.Tech., Materials Science and Engineering, Indian Institute of Technology Kanpur, 2012
Advisor: **Prof. Dipak Mazumdar** *GPA: 7.9/10.0*
- B.E., Metallurgical and Materials Engineering, Jadavpur University, Kolkata, India, 2010
Advisor: **Prof. Dinabandhu Ghosh** *GPA: 8.2/10.0*

Technical Skills

- **Simulation/Program:** C, Matlab, Genetic Algorithm (GA), Machine Learning, COMSOL, Abaqus, TC Prisma, Thermo-Calc, Origin, MS office, Image J
- **Fabrication techniques:** Laser processing, Friction stir welding, CNC, Casting
- **Sample preparation:** Mechanical and chemical polishing, Vibromet polishing, Electro-polishing, Ion-milling, Dimple grinding, TEM and 3D atom probe sample preparation using focused ion beam (FIB)
- **Characterization:** Metallographic sample preparation, X-Ray diffraction, Scanning electron microscopy (SEM), Electron back scattered diffraction (EBSD), Transmission electron microscopy (TEM), Focused ion beam (FIB), Optical microscopy, 3D atom probe
- **Mechanical and thermal testing:** Creep, Nano-indentation, Quenching Dilatometer, Wear, Mini-tensile, Micro-hardness, Differential scanning calorimetry (DSC), Thermo Gravimetric Apparatus (TGA)

Relevant Coursework

- Simulation and Optimization of Metallurgical processes, Process modeling, C language, Design of Experiments
- Electronic properties of materials, Transmission electron microscopy (TEM), Scanning electron microscopy (SEM)
- Thermodynamics, Crystallography, Phase transformation, Mechanical behavior of metals, Physical and mechanical metallurgy, Welding technology, Iron and steel making
- Simulation and Optimization of Metallurgical processes, Process modeling

Research/Academic Experience

Indian Institute of Technology Kharagpur (Project Scientist) **April 2023-Present**

- Investigation of texture in secondary TMP Ti-6Al-4V alloy

CSIR-National Metallurgical Laboratory, Jamshedpur (Project Scientist) Feb 2021- Mar 2023

- Design and development of metal additive manufacturing
 - Optimization of SLM process parameters for 316L stainless steel
 - Microstructural and mechanical aspect of 3D manufactured 316L steel
 - Design of aerospace materials
- Developing digital contents for school students in the field of metallurgy

Netaji Subhas Institute of Technology, Bihra (Dean Academics) July 2019-Oct 2020

- Co-ordinated the academic curriculum
- Research and teaching

Madanapalle Institute of Technology & Science (Sr. Assistant Professor) Oct 2018-July 2019

- Research and teaching

University of Pittsburgh (as Postdoctoral associate) Sep. 2017-June 2018

- Integrated Computational Materials Design for additive manufacturing High-strength steels
 - Designed high strength steel using CALHAD-based simulation
 - Validated the design materials via different processing and characterization techniques

University of North Texas (As PhD student and Graduate research assistant) 2012-2017

- Simulation of microstructural evolution during friction stir welding/processing of Al 7050 alloy and property prediction
 - Simulated the FSW process for temperature using finite element simulation approach
 - Precipitation modeling through TC PRISMA and Thermo-Calc software
 - Strength prediction based on simulated microstructure
- Microstructural evolution of high temperature materials through materials by design using genetic algorithm approach
 - Designed Ni-Cr ODS alloy using GA approach models to fulfill the need for coal-power plants.
 - Designed alloy were prepared using ball milling and SPS.
 - Ni-20Cr-1.2Y₂O₃-5.0Al₂O₃ alloy exhibited remarkable creep resistance with minimum creep rate of $\sim 2.3 \times 10^{-9} \text{ s}^{-1}$ under conditions of 100 MPa and 800°C.
- Study of friction stir processing in titanium and A286 steel alloys

- Achieved exceptional tensile strengths up to 2GPa along with 5% tensile elongations for Ti 6246.
- Enhanced the surface wear properties of A286 through friction stir processing and hybrid Laser-friction stir welding integration technique.
- Study of microstructure and mechanical property of laser additive Ti-64 impeller
Indian Institute of Technology Kanpur(As Masters student) 2010-2012
- Investigated the role of Tundish design on residence time distribution (RTD) and slag entrainment phenomena in steel making
Jadavpur University(as undergraduate student) 2006-2010
- Developed a novel approach for Measurement of The Standard Free Energy Change
Tata steel (summer project)(as summer trainee) 2009
- Studied the mixing behavior in the BOF Vessel through a scale-down physical model at Tata Steels

Proposal Writing Experience

- “*High Entropy Alloy Development for Advanced Manufacturing of Energy Power Plants with Improved Sustainability*” (2018, MCSI’s sustainable engineering, USA, \$50K, PI: Dr. Wei Xiong, **co-PI: Dr. Aniket K. Dutt**)
- “*Design-to-Component, Closed-Loop ICME Development of Additive Manufacturing Alloys for Naval Applications*”, (2017, Funded by Naval research lab, USA, Funding: \$450K, PI: Dr. Rajiv Mishra)
- “*Friction Stir Additive Manufacturing for Gradient Structures for Small Modular Reactors*” (2015, Funded by DOE, Funding: \$150K, PI: Dr. Rajiv Mishra)
- “*Friction Stir Additive Manufacturing for Advanced Fossil Energy Applications*” (2015, Funded by DOE, Funding: \$150K, PI: Dr. Rajiv Mishra)
- “*Improved Models of Long Term Creep Behavior of High Performance Structural Alloys for Existing and Advanced Technologies Fossil Energy (FE) Power Plants*” (2016, Rejected by NETL, DOE, PI: Dr. Rajiv Mishra)

Scholastic Achievements and Extracurricular Activities

- Reviewer of Peer-reviewed Journals Metallurgical and Materials Transactions and ASM
- Chaired the symposium sessions in MS&T and TMS International Conferences
- Received “Meera Rani Mitra Memorial Award” for being 3rd year departmental topper in Jadavpur University
- Secured “Bronze Medal” for academic Excellence
- Distinguished Honors in Bachelor of Engineering
- 2nd place in the Federation Symposium in Math, Science and Technology Category
- Secured 1st prize in MEKAMIX, a technical fest held in TECHNO INDIA GROUP
- Worked as a Department Placement coordinator at IIT Kanpur
- Worked as a Student Representative to DPGC at IIT Kanpur

Conferences

- **TMS 2017**, San Diego, CA, “On the Creep Behavior of Dual-Scale Particle Strengthened Nickel Based Alloy

- **TMS 2016**, Nashville, TN, “Measurement of the Standard Free Energy Change of a Chemical Reaction by the Chemical Equilibration Technique” and “Microstructural Evolution of High Temperature Ni-Cr ODS Alloy: Genetic Algorithm Approach”
- **TMS, 2015**, Orlando, FL, “Microstructural optimization of high temperature Ni-Cr ODS alloy using genetic algorithm” and “Development of Ni-Cr Based Alloys via Spark Plasma Sintering for High Temperature Applications”
- **MS&T 2015**, Columbus, OH, “Exceptional strength in friction stir processed beta titanium alloys” and “The Role of Tundish Design On Residence Time Distributions (Rtd) And Slag Entrainment Phenomena”

Publications

Google Scholar Link: <https://scholar.google.com/citations?user=0Xix9i8AAAAJ&hl=en>

1. A novel nano-particle strengthened titanium alloy with exceptional specific strength: **Aniket K. Dutt**, Bharat Gwalani, VedavyasTungala, Matthew Carl, Rajiv S. Mishra, Sesh A. Tamirisakandala, Marcus L. Young, Kyu C. Cho & Raymond E. Brennan, *Scientific Reports* 9, 11726 (2019).
2. Friction Stir Processing of Beta C and Ti-185: A Unique Pathway to Engineer Microstructures for Exceptional Properties in β Titanium Alloys: VedavyasTungala, **Aniket K Dutt**, Deep Choudhuri, Rajiv S Mishra, Sesh A Tamirisakandala, Kyu C Cho, Raymond E Brennan, *Metallurgical and Materials Transactions A* 50 (9) (2019), 4075-4084.
3. On the Creep Behavior of Dual-Scale Particle Strengthened Nickel Based Alloy: **Aniket K. Dutt**, SomayehPasebani, IndrajitCharit, Rajiv S. Mishra, *Materials Science and Engineering: A* 676 (2016), 406-410.
4. Oxide dispersion strengthened nickel based alloys via spark plasma sintering: S Pasebani, **AK Dutt**, J Burns, I Charit, RS Mishra *Materials Science and Engineering: A* 630 (2015), 155-169.
5. Spatially dependent properties in a laser additive manufactured Ti-6Al-4V component: S Palanivel, **AK Dutt**, EJ Faierson, RS Mishra *Materials Science and Engineering: A* 654 (2016), 39-52.
6. Friction Stir Processing of Beta Titanium Alloys: Challenges and Opportunities: SeshTamirisakandala, V Tungala, **Aniket Dutt**, RS Mishra, Jim Williams, *Aeromat conference* (2014).
7. Friction Stir Processing of A286 Stainless Steel: Microstructural Evolution during Wear”: OO Tinubu, S Das, **A Dutt**, JE Mogonye, V Ageh, R Xu, J Forsdike, RS Mishra, TW Scharf, *Wear*, 356 (2016) 94-100.
8. Measurement of the Standard Free Energy Change of Chemical Reactions by the Chemical Equilibration Technique using a Thermogravimetric Apparatus: A Novel Approach: **Aniket K. Dutt** and Dinabandhu Ghosh, *Materials Science and Engineering International Journal*, 1 (2017) 1-4.
9. The Role of Tundish Design on Residence Time Distributions (RTD) and Slag Entrainment Phenomena: **AK Dutt**, D Mazumdar, *Materials Science & Technology 2015 conference proceedings*
10. Nickel-Chromium Alloys: Engineered Microstructure via Spark Plasma Sintering: SomayehPasebani, **Aniket K Dutt**, IndrajitCharit, Rajiv S Mishra, *Materials Science Forum* 783, (2014) 1099-1104.
11. Effect of Substructure on Hardness and Conductivity of Copper During Annealing: SrijanSengupta, Pawan Kumar, Mamookho Elizabeth Makhatha, **Aniket Kumar Dutt**, *Transactions of the Indian Institute of Metals*, 73, (2020), 1543–1547
12. EBSD Investigation to Study the Restoration Mechanism and Substructural Characteristics of 23Cr-6Ni-3Mo Duplex Stainless Steel During Post-deformation Annealing: Pawan Kumar, Peter Hodgson, Hossein Beladi, Mamookho Elizabeth Makhatha, **Aniket Kumar Dutt**, *Transactions of the Indian Institute of Metals*, 73, (2020), 1421–1431

- 13 Prediction of the Propagation of Fatigue Cracks in Part-Through Cracked Pipes with CASCA and FRANC2D: Pawan Kumar, Mamookho Elizabeth Makhatha, SrijanSengupta, **Aniket Kumar Dutt**, Transactions of the Indian Institute of Metals, 73, (2020) 1417–1420
- 14 Micromechanical Modeling of Ferrite–Austenite Interphase of 23Cr-6Ni-3Mo Duplex Stainless Steel with an Initial Equiaxed Austenite Morphology Using Finite Element Methods: Kumar P., Choudhury A.R., Basantia S., **Dutt A.** (2021). In: Arockiarajan A., Duraiselvam M., Raju R. (eds) Advances in Industrial Automation and Smart Manufacturing. Lecture Notes in Mechanical Engineering. Springer, Singapore
- 15 Application of Artificial Neural Network to Friction Stir Welding Process of AA7050 Aluminum Alloy: **Dutt A.K.**, Sindhuja K., Reddy S.V.N., Kumar P. (2021) In: Arockiarajan A., Duraiselvam M., Raju R. (eds) Advances in Industrial Automation and Smart Manufacturing. Lecture Notes in Mechanical Engineering. Springer, Singapore. https://doi.org/10.1007/978-981-15-4739-3_34
- 16 Restoration Mechanism and Sub-Structural Characteristics of Duplex Stainless Steel with anInitial Equiaxed Austenite Morphology during Post-Deformation Annealing: Pawan Kumar, Peter Hodgson, Hossein Beladi, Amit Roy Chowdhury, Mamookho Elizabeth Makhatha, **Aniket K Dutt**, Key Engineering Materials 882 (2021) 64-73
- 17 Optimization of Test Procedure for Simulation of Paper Laminate in Axial LoadingConditions Using FRANC2D and CASCA: Pawan Kumar, Bipin Bihari Verma, ManvendraTiwari, SrijanSengupta, **Aniket K Dutt**, Mamookho Elizabeth Makhatha, Key EngineeringMaterials 882 (2021) 132-139
- 18 A Machine Learning Approach to Predict the Performance of Refrigerator and AirConditioning Using Gaussian Process Regression and Support Vector Methods: HarinarayanSharma, SonamKumari, **Aniket K. Dutt**, Pawan Kumar, Mamookho E. Makhatha, RecentPatents on Mechanical Engineering 14, (2021) 1-8
- 19 Prediction of surface roughness for CNC turning of AISI 1030 steel: A machine learning approach: Harinarayan Sharma, Ankit Sahay, SonamKumari, **Aniket K. Dutt**, Journal of Metallurgy and Materials Science 63 (2021) 33-40
- 20 Optimization of selective laser melting (SLM) additive manufacturing process parameters of 316L austenitic stainless steel: **Aniket K Dutt**, GK Bansal, S Tripathy, K Gopala Krishna, VC Srivastava, S Ghosh Chowdhury Transactions of the Indian Institute of Metals, (2022) <https://doi.org/10.1007/s12666-022-02687-2>

References

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