

Curriculum Vitae of Dr. Sujoy Kumar Kar

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| NAME IN FULL: SUJOY KUMAR KAR ADDRESS: METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT, INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR, KHARAGPUR, WEST MIDNAPUR, WEST BENGAL, 721302, INDIA | Date of Birth: 03 JANUARY, 1979 |
| | Nationality: INDIAN |
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EDUCATIONAL QUALIFICATIONS:

| Degree / Examination | University / Institution | Year | Specialization | Division / Class | % of Marks | Rank in Board / University |
|---|--|------|---------------------------------------|------------------|------------|----------------------------|
| Ph.D. | THE OHIO STATE UNIVERSITY, USA | 2005 | MATERIALS SCIENCE & ENGINEERING | 1 st | 3.86 / 4.0 | NA |
| M.Tech. or Equiv./ M.Sc. / M.S. | THE OHIO STATE UNIVERSITY, USA | 2003 | MATERIALS SCIENCE & ENGINEERING | 1 st | 3.87 / 4.0 | NA |
| B.Tech. for Equiv./ B.Sc. / B.A. | IIT KHARAGPUR, INDIA | 2001 | METALLURGICAL & MATERIALS ENGINEERING | 1 st | 8.88/ 10.0 | FIRST RANK |
| H.S. or Equivalent | RAMAKRISHNA MISSION RESIDENCIAL COLLEGE, NARENDRAPUR | 1997 | SCIENCES, STATISTICS, LANGUAGES | 1 st | 85.6 % | |
| Madhyamik or Equivalent | RAMAKRISHNA MISSION VIDYAPITH, PURULIA | 1995 | | 1 st | 88.2% | |

EXPERIENCE (Indicated the latest first)

| University / Organization | Designation | From | To | Total Period | Nature of Experience |
|--|--|--------------------|----------------------------|-------------------|--|
| Metallurgical and Materials Engineering Dept., IIT Kharagpur | Assistant Professor | 25 May 2010 | Present (30 November 2018) | > 8 years | Teaching, Research and Research Guidance |
| GE Global Research Center | Lead Scientist (later), Initially joined as research scientist | 08 August, 2005 | 21 May 2010 | 4 years 10 months | Research, Research Guidance |
| The Ohio State University | Graduate Research Associate | 19 September, 2001 | 29 July, 2005 | 3 YEARS 10 months | Research |
| Cognizant Technology Solutions | Software Engineer | 21 MAY, 2001 | 31 August, 2001 | 3 & half months | Software development |
| TATA STEEL | Intern | 08 May, 2000 | July, 2000 | 2 months | Technical project |

Research Guidance

| Degree | Number Completed | Number in progress |
|-----------|------------------|--------------------|
| Doctoral | 2 | 6 |
| M.Tech/MS | 10 | 4 |

Publication details:

| Publication/ Patent/ Copyright type | Number accepted/ published |
|--|----------------------------|
| Publication in Referred Journal/s[International] | 29 |
| Publication in Proceeding of seminars/Conferences[International] | 6 |
| Disclosure for patent | 1 |

Sponsored research/ consultancy presently undertaken;

| Project Name | Sponsored by | Duration (months) | Project Value (in lakhs of INR) |
|--|---|-------------------|---------------------------------|
| Development of High Performance Materials for Various Defence Related Applications | DRDO | 36 | 442.45 |
| Impacting Research Innovation and Technology (IMPRINT) Round-I Operational Project for IMPRINT I Cell at IIT Kharagpur | MHRD | 24 | 195.6 |
| IMPRINT Cell at Indian Institute of Technology Kharagpur (ITK) | SERB, DST | 12 | 20 |
| Exploring Solutions for Various Technological Challenges in Metal Additive Manufacturing Technology and Sharing the Relevant Know-how with Indian Heavy Engineering Industries | Dept. of Heavy Industries | 60 | 499.4 |
| Indigenous Development of Ultra High Strength Steel with Stainless Property for Space Application (IMPRINT Project No.: 6456) | MHRD + Ministry of Steel | 36 | 281 |
| Setting Up High-End Testing Facilities of Materials for Biomaterials, Aerospace and Automotive Applications (SGDRI-2015) (as co-PI) | IIT Kharagpur | 36 | 250 |
| Completed | | | |
| Study of correlation between Processing, Microstructure, Microtexture and Property in a high strength, beta Titanium alloy Ti-5Al-5Mo-5V-3Cr | Defence Research Development Organization | 36 | 37 |
| Experimental Evaluation on FLD and forming behavior of differently heat treated IN718 material | Indian Space Research Organization | 36 | 28 |
| Correlation between Processing, Microstructure, Microtexture & Property in β Titanium alloy | Indian Institute of Technology Kharagpur | 44 | 5 |
| Artificial Neural Network Modeling of Materials | General Electric | 12 | 2.5 |
| FIST PROGRAM – 2012 (as Co-PI) | Department of Science and Technology | 60 | 245 |

Brief Outline of Research contribution:

1) Ti Alloy Research: 11 Publications, 1 PhD, 1 M.Tech.

- i) Developed stereological procedures to quantify different microstructural features in α/β Ti alloy
- ii) Developed model for quantitative predictions of properties from microstructure input data
- iii) Discovered the reasons behind anomalous trend of strength with prior β grain size
- iv) Discovered the desired microstructure and hence the optimized processing window to obtain best combination of Yield Strength and Fracture Toughness in near β Ti alloy
- v) Discovered the mechanisms of formation of colony vs. basketweave microstructure in alpha beta Ti alloys;
- vi) Constructed the TTT diagram for Ti-5553 alloy.

2) Ni Alloy Research: 8 publication, 2 ongoing PhD

- i) Developed microstructure based temperature sensitive stress strain model for Ni based superalloy
- ii) Established dependency of misfit strain between γ and γ' on cooling rate for Haynes 282 alloy.
- iii) High temperature LCF behaviour of Haynes 282 alloy as a function of temperature, microstructure and strain range

3) High temperature materials: 5 publications

- i) Developed validated thermodynamic databases for Mo-Ti-Zr-C and Mo-W-Si-C systems
- ii) Phase field modelling of solidification microstructure and phase stability prediction at the substrate bond coat interface for Nb-Si-Ti-Hf based alloys.

4) Others: Al alloys, GaAs, Composite material, Steel: 7 publications

Research Areas:

- Physical and Mechanical Metallurgy
- Processing-Microstructure-Microtexture-Property Relationship
- Materials and property modeling
- Materials systems: Ti alloys and Ni based superalloys and steels for energy applications

Awards & Honours:

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| • Patents & Publication Award in recognition of impactful contributions in the area of publications from GE Global Research Center (2008) |
| • Institute Silver Medal From IIT Kharagpur as the best BTech student of the outgoing batch of 2001 in the department of Metallurgical and Materials Engineering Me (2001) |
| • J C Ghosh Memorial Prize Award for standing first by merit in Metallurgical and Materials Engineering Department, IIT Kharagpur (2001) |
| • Ava Sanyal Memorial Award given to the student with the highest GPA in the class (2000) |
| • Bengal Ingot Silver Medal Award from the Institute of Indian Foundry men for the best project work in foundry at undergraduate level (2002) |
| • Indranil Award for Metallurgy from the Mining, Geological and Metallurgical Institute of India (2000) |
| • First Prize in Technical Paper Contest in a national symposium COMPOSIT on Advanced Materials in IIT Kharagpur (2000) |

Member of Professional Bodies:

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| • Member : TMS, ASM International, Indian Institute of Metals, Alpha Sigma Mu (the International Professional Honour Society for Materials Science & Engineering) |
| • Committee member of two different technical groups of : The Minerals, Metals & Materials Society (TMS) |

Publications in SCI Journals:

2017 - 2018:

- Thermo-mechanical processing window for phase recrystallization in Ti-5Al-5Mo-5V-3Cr alloy by Sen M., Suman S., Kumar M., Banerjee T., Bhattacharjee A., Kar S. K. *Materials Characterization* 146 **55-70** (2018)
- High temperature low cycle fatigue behaviour in Haynes 282 An investigation on influence of microstructure by Barat K., Ghosh M., S S., Tarafder S., Kar S. K. *Metallurgical and Materials Transactions A* - (2018)
- Effect of solution treatment on formability of IN718 sheets and their post-forming metallurgical characterizations for space applications by Prasad S., Panda S. K., Kar S. K., Murty S., Sharma S. C. *Materials Science and Engineering A* - (2018)
- Creep Fatigue Interaction under Different Test Variables: Mechanics and Mechanisms by Barat K., S S., Kar S. K., Tarafder S. *Journal of Testing and Evaluation* 46 - (2018)
- Prediction of fracture and deep drawing behavior of solution treated IN718 sheets: numerical modeling and experimental validation by Prasad S. K., Panda S. K., Kar S. K., Murty S., Sharma S. C. *Materials Science and Engineering: A* 733 **393-407** (2018)
- Effect of solution treatment on the formability and part performance of IN718 sheet material by Prasad S. K., Panda S. K., Kar S. K., Murty S., Sharma S. K. *Advances in Materials and Processing Technologies* 4 **680-694** (2018)

2016 - 2017:

- Microstructures, forming limit and failure analyses of Inconel 718 sheets for fabrication of aerospace components by Prasad S., Panda S. K., Kar S. K., Murty S., Sharma S. C. *Journal of material engineering and performance* 26 1-18 (2017)

2014 - 2015:

- Ultrasonic quantification of high temperature cyclic damage in an advanced nickel based superalloy by Kaustav Barat, A. Metya, S. Sathpathy, S. Sivaprasad, S. Tarafder and Sujoy Kumar Kar *Materials Science and Engineering A*, **625, 194-204** (2015)
- Influence of PWHT on toughness of high chromium and nickel containing martensitic stainless steel weld metals by M. Divya, C. Das, S. Mahadevan, Shaju Albert, R. Pandian, Sujoy Kar, Arun Bhaduri, and T. Jayakumar *Metallurgical and Materials Transactions A*, **46A, 2554-2567** (2015)
- Influence of boron and nitrogen in the heat affected zone of modified 9Cr-1Mo steel - Gleeble simulation study by C.R. Das, A.K. Bhaduri, S. Lakshmi, Sujay Chakravarty, Sujoy Kumar Kar, S.K. Albert *Welding in the World*, **DOI 10.1007/s40194-0** (2015)
- Effect of Bending Strain in Forming Limit Strain and Stress of IN-718 Sheet Metal by Sajun Prasad, Sushanta Panda, Sujoy Kumar Kar, S.V.S. Narayana Murty, S.C. Sharma *Materials Science Forum*, **Accepted** (2015)

Publications: 2013 – 2014:

- Microstructure based and temperature dependent model of flow behavior of a polycrystalline nickel based superalloy by Sujoy Kumar Kar, S. K. Sondhi *Materials Science and Engineering: A*, **601, 97-105** (2014)
- Phase Stability in the Mo-Ti-Zr-C system via Thermodynamic Modeling and Diffusion Multiple Validation by Sujoy Kumar Kar, Voramon S. Dheeradhada, and Don M. Lipkin *Metallurgical and Materials Transactions A*, **44 (8) 3999 - 4010** (2013)

- Effect of solution treatment and aging on microstructure and tensile properties of high strength beta titanium alloy, Ti-5Al-5V-5Mo-3Cr by Shashi Shekhar Rajdeep Sarkar Sujoy Kar Amit Bhattacharjee *Materials and Design Online version: <http://dx.doi.org/10.1016/j.matdes.2014.04.015>, Online published (2014)*
- Processing-Microstructure-Yield strength correlation in a near beta Ti alloy, Ti-5Al-5Mo-5V-3Cr by Sujoy Kumar Kar, Swati Suman, S Sivaprasad, Atanu Chaudhuri, Amit Bhattacharjee *Materials Science and Engineering A*, **610**, pp. **171-180** (2014)

Publications: 2012 – 2013:

- Microstructure–fracture toughness correlation in an aircraft structural component alloy Ti–5Al–5V–5Mo–3Cr by Atasi Ghosh, S. Sivaprasad, Amit Bhattacharjee, Sujoy Kumar Kar *Materials Science and Engineering: A*, **Volume 568**, Pages **61** (2013)
- Quantitative Microstructural Characterization of a near beta Ti alloy, Ti-5553 under Different Processing Conditions by Sujoy Kumar Kar, Atasi Ghosh, Nishant Fulzele, Amit Bhattacharjee *Materials Characterization*, **81** **37-48** (2013)
- Review of Phase Transformations in Multicomponent Melts, edited by Dieter M. Herlach by Sujoy Kumar Kar *Materials and Manufacturing Processes*, **Volume: 28**, pp: **225** (2013)

Publications: 2009 – 2010:

- Evolution of microstructure and mechanical properties during annealing of cold-rolled AA8011 alloy by R.K. Roy, S. Kar, S Das *Journal of Alloys and Compounds*, **468(1-2)**, **122-129** (2009)
- Solidification Microstructure Evolution Modeling in Nb-Si Based Intermetallics-Strengthened-Metal-Matrix Composites by S Kar, B P Bewlay, Y Yang *Advanced Intermetallic-Based Alloys for Extreme Environment and Energy Applications*, ed. M. Palm et., **Volume 1128** (2009)
- Phase equilibrium in Mo-Rich Mo-Ti-Zr-C alloys by Dheeradhada, V.S., Lipkin, D.M., Wark, D.A., Kar, S., Tiarney, T.C. *Processing Materials for Properties 2008, PMP III*, **744-749** (2009)

Publications: 2008 – 2009:

- A CALPHAD-Based Phase Equilibrium Model Of Mo-Ti-Zr-C by S Kar, Don Lipkin *Proceedings of TMS Annual Meeting: Computational Thermodynamics and Kinetics*, (2008)

Publications: 2007 – 2008:

- Thermodynamic and microstructural modeling of Nb-Si based alloys by S. Amancherla Sundar, S. Kar, B Bewlay, Y Yang Austin Chang *Journal of phase equilibria and diffusion*, **28**, **2-8** (2007)

Publications: 2006 – 2007:

- Selection of alpha variants during microstructural evolution in alpha/beta titanium alloys by E. Lee, R. Banerjee, S. Kar, D. Bhattacharyya, and, H. L. Fraser *Philos. Mag. A*, **87(24)**, **3615** (2007)
- Root-like Structure at the Nanowire / Substrate Interface in GaAs Nanowires by R. Banerjee, D. Bhattacharyya, A. Genc, S. Kar, R. Ratan, A.P. Shah, M.R. Gokhale, and B. M. Arora *Appl. Phys. Lett.*, **88**, **031919** (2006)
- A study of precipitation and recrystallization behavior of aluminum alloy AA1235 by R.K Roy, S. Kar, K. Das and S.Das *J. of Mat. Sci.*, **41**, **1039-1045** (2006)

- Design Tools for Structural Metallic Materials by Collins, PC, Kar, S, Searles, T, Koduri, S, Viswanathan, GB, Tiley, J, Banerjee, R, and Fraser, HL *Proceedings of Frontiers in the Design of Materials (FDM-NMD-ATM)*, (2006)

Publications: 2005 – 2006:

- Modeling The Tensile Properties in Beta-Processed Alpha/Beta Ti Alloys by S. Kar, T. Searles, E. Lee, G.B. Viswanathan, J. Tiley, R. Banerjee, H. L. Fraser *Metallurgical and Materials Transactions A*, **37A (3), 559** (2006)
- Rapid Characterization of Titanium Microstructural Features for Specific Modeling of Mechanical Properties by T. Searles, J. Tiley, A. Tanner, R. Williams, B. Rollins, E. Lee. S. Kar, R. Banerjee, and H. L. Fraser *Measurement Sci. Technol.*, **16(1), 60** (2005)
- Quantification of Alpha Laths in Alpha/Beta Titanium Alloys by R E A Williams, T Searles, S Kar, M Uchic, D Dimiduk and H Fraser *Microscopy and Microanalysis*, **11, Supplement S02** (2005)
- Microstructures and tensile properties of commercial purity aluminum alloy AA1235 under different annealing conditions by R.K. Roy, S. Kar, K. Das and S. Das *Materials Letters*, **59 2418-2422** (2005)
- Evolution of In-Situ generated Reinforcement Precipitates In Metal Matrix Composites by S. Sen, S.K. Kar, A.V. Catalina, D.M. Stefanescu, and B.K. Dhindaw *Transactions of the Indian Institute of Metals, An International Journal of Minerals, Metals and Mat*, **vol. 58, 709-714** (2005)
- Influence of Crystallographic Variant Selection on Microstructural Evolution in Titanium Alloys by S. Kar, R. Banerjee, E. Lee, and H. L. Fraser *Solid-Solid Phase Transformations in Inorganic Materials, Edited by J. M. Howe et. al.*, (2005)

Publications: 2004 – 2005:

- Quantification of microstructural features in alpha/ beta Titanium alloys by J. Tiley, T. Searles, E. Lee, S. K. Kar, R. Banerjee, J. C. Russ and H. L. Fraser *Mat. Sci. Eng. A*, **372 (1-2), pp 191** (2004)

Some Earlier Publications:

- Quantification of microstructural features in alpha/ beta Titanium alloys by J. Tiley, T. Searles, E. Lee, S. K. Kar, R. Banerjee, J. C. Russ and H. L. Fraser *Mat. Sci. Eng. A*, **372 (1-2), pp 191** (2004)
- Modeling the Relationships between Microstructural Parameters and the Tensile Properties in Ti-6Al-4V using Neural Networks and Fuzzy Logic Models by J. Tiley, R. Banerjee, T. Searles, S. Kar, and H. Fraser *Titanium 2003: Proceedings of the Tenth World Conference on Titanium*, (2003)
- Infiltrated cast SiCP reinforced Al/Mg alloy matrices composites – experimental and modeling studies by B.K. Dhindaw, S.K. Thakur, S.K. Kar, and V. Vohra *Proceedings of Solidification and Casting Science Conference*, (2001)
- Investigation of GaAs nanowires grown via MOVPE using the Vapour–Liquid–Solid technique by A Bhattacharya, R Banerjee, R Ratan, S Kar, M R Gokhale, A P Shah, J Bhattacharyya, K L Narasimhan, B M Arora *10th European workshop on MOVPE*, **8 - 11 June** (2003)