Suman Sarkar

PhD (Materials Engineering)
Indian Institute of Science, Bangalore

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Panchanan Apartment
Manikpur, Midnapore
West Midnapore
PIN – 721101, WB, India

Current Position

Visiting Faculty **09/2019- Present**
Department of Materials Engineering
Indian Institute of Technology Jammu, India

Professional Experience (Teaching and Research)

Research Areas:

Ferromagnetic Shape Memory Alloys, Transmission Electron Microscopy, Non Equilibrium Processing, Thermodynamics, Phase Transformation, Liquid Metal Smart Composites, High Strength High Heat Flux Space Materials, High Entropy Alloys, Transport Properties, 3D Printing, Phase Field Modeling, Ceramic Systems

Teaching Areas:

Thermodynamics, Phase Transformation, Alloy Design Principle, Crystal Defects, Materials Processing, Electron Microscopy, Structure Characterization, Computational Techniques, Ceramic Systems and Processing, Glass Technology

Scientist C **12/2017- 09/2019**
Technical Research Centre
S. N. Bose National Centre for Basic Sciences, DST, Govt. of India,
Kolkata, India

Assistant Professor **08/2017-12/2017**
Department of Nanotechnology
Amity University
Kolkata, India

Postdoctoral Fellow **06/2016-07/2017**
Materials Engineering
Indian Institute of Science, Bangalore, India

Research Intern **1/2006-07/2006**
CSIR-Central Glass and Ceramic Research Institute
Kolkata, India

Professional Experience (Industrial)

Executive Technical and Marketing Services **08/2004-12/2004**
Development Alternatives
New Delhi, India

Production Engineer **06/2004-08/2004**
M/S TATA Ceramics Ltd
Cochin, Kerala, India

Course Taught

Course Name and Credit (L-T-P):
1. Electron Microscopy, Microstructural Dynamics and Design (MSL750):
3-0-0: UG and PG students
Role: Coordinator and Primary Instructor
Organization: Indian Institute of Technology Jammu, 2020

2. Introduction to Engineering (NIN100): **(0:0:2):** UG students
Role: Associate Instructor
Organization: Indian Institute of Technology Jammu, 2020

3. Product Realisation (DIP003U1M): **(0:0:4):** UG students
Role: Associate Instructor
Organization: Indian Institute of Technology Jammu, 2020

4. Basics of Thin Film Technology **(3-0-0):** PG students
Role: Primary Instructor
Organization: Amity University Kolkata, 2017

Education

PhD

Specializations:

Electron Microscopy, X-Ray Diffraction, Thermal Analysis, Physical Metallurgy, Alloy Development, Thermodynamics, Phase Transformation, Rapid Solidification, Mechanical and Electrical Properties

PhD, Department of Materials Engineering, **2009-2016**
Indian Institute of Science, (IISc), Bangalore, India

Supervisors: Prof. Kamanio Chattopadhyay and Prof. Chandan Srivastava

Dissertation: **Development of New High Strength Alloy in Cu-Fe-Si System through Rapid Solidification.**

Major Course Taken (CGPA-7.0/8.0): Solidification, Electron Microscopy

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Post-Graduation

Specializations:

Phase Field Modeling, Thermodynamics, Phase Transformation, Diffusion Mechanism, Numerical Simulations, Computational Techniques

Master of Science and Engineering in Materials Engineering
(MSc, Engg, Computational Materials) **2006-2009**
Department of Materials Engineering,
Indian Institute of Science (IISc), Bangalore, India

Supervisor: Prof. T. A Abinandanan

Thesis Title: **Effect of Atomic Mobility in the Precipitate Phase on Coarsening: A Phase Field study.**

Major Course Taken (CGPA-6.3/8.0): Chemical Engineering Mathematics, Crystal Defects, Phase Transformation, Metallurgical Thermodynamics

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Under Graduation

Specializations:

Structural Ceramics, Refractories, Cement-Composites, Electronic Ceramics, Ceramic Processing

Bachelor of Technology in Ceramic Technology (B.Tech) **2000-2004**
Government College of Engineering and Ceramic Technology
University of Calcutta, Kolkata, India

Project 1: Kinetics of thermal dehydration of Calcium Aluminate cement hydrates of different $CaO:Al_2O_3$ molar ratio under non-isothermal conditions.

Project 2: Optimization of grannulometry of TATA SR1 DBMC quality Refractory product, in M/S TATA Refractories Ltd, Orissa, India

Major Course Taken (Marks-76%): Electro Ceramics, Glass, Refractories, Thermodynamics, Ceramic Processing

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School Examinations

Higher Secondary School Examination **2000**
WBCHSE, West Bengal Board
Stream: **Science**

Marks: 86.3%

Secondary School Examination **1998**
WBBSE, West Bengal Board
Stream: **General**

Marks: 90%

List of Selected Publications

1. Abhishek Bagchi, **Suman Sarkar***, Sandip Bysakh, Chandra Sekhar Tiwary, Md Sarowar Hossain, Susenjit Sarkar, P.K.Mukhopadhyay**,** "Microstructural evolution and its outcome on the photo induced micro actuation effect and mechanical properties of copper doped Co-Ni-Al FSMA," ***Journal of Alloys and Compounds,*** **Vol.846, 156432, (2020), *Corresponding Author**

2. Abhishek Bagchi, **Suman Sarkar***, Sandip Bysakh, Susenjit Sarkar and P. K. Mukhopadhyay, "Studies on effect of temperature on the Photo Induced Micro-Actuation effect of a Co-based FSMA system" ***Journal of Shape Memory and Superelasticity***, **(https://doi.org/10.1007/s40830-020-00270-6), (2020) * Corresponding Author**

3. Chandra Sekhar Tiwary, Manas Paliwal, Sanjay Kashyap, Praful Pandey, **Suman Sarkar**, Ipshita Kundu, Shakti Bhaskar, In-Ho Jung, K Chattopadhyay, Dipankar Banerjee, "Microstructures and mechanical properties of ternary Ti–Si–Sn alloys" ***Materials Science and Engineering: A,*** **770, 138472 (2020)**

4. AS Dipak Kumar, M. S. Bhaskar, **Suman Sarkar**, T. A. Abinanadanan, "Phase Field Modelling of Precipitate Coarsening in Binary Alloys with Respect to Atomic Mobility of Solute in the Precipitate Phase", ***Trans Indian Inst. Met (Springer)***, **(https://doi.org/10.1007/s12666-020-01910-2), (2020)**

5. Abhishek Bagchi, **Suman Sarkar**, Sandip Bysakh, Susenjit Sarkar, and P. K. Mukhopadhyay. "Possible mechanisms for degradation of photo induced micro actuation effect in a ferromagnetic shape memory alloy at high temperatures" ***Journal of Applied Physics,*** **125, (2019)**

6. **Suman Sarkar*,** C Srivastava, Kamanio Chattopadhyay. "Development of a new class of high strength copper alloy using immiscibility route in Cu-Fe-Si system: Evolution of hierarchical multi-scale microstructure" ***Materials Science and Engineering*****: *A* 723, 38-47, (2018)**

7. Surekha Yadav, **S. Sarkar**, Akash Aggarwal, Arvind Kumar and Krishanu Biswas. "Wear and Mechanical Properties of Novel (CuCrFeTiZn)100-xPbx High Entropy Alloy Composite via Mechanical Alloying and Spark Plasma sintering" ***Wear*** **(https://doi.org/10.1016/j.wear.2018.05.023), (2018)**

8. Reshma Sonkusare, P Divya Janani, NP Gurao, **S Sarkar**, S Sen, KG Pradeep, Krishanu Biswas. "Phase equilibria in equiatomic CoCuFeMnNi high entropy alloy" ***Materials Chemistry and Physics*****, 210, 1, 269-278, (2018)**

9. Zixing Wang, VidyaKochat, Prafull Pandey, Sanjay Kashyap, Soham Chattopadhyay, Atanu Samanta, **Suman Sarkar**, Praveena Manimunda, Xiang Zhang, Syed Asif, Abhisek K. Singh, Kamanio Chattopadhyay, Chandra Sekhar Tiwary, and Pulickel M. Ajayan." Metal Immiscibility Route to Synthesis of Ultrathin Carbides, Borides, and Nitrides". ***Advanced Materials,*** **1700364, (1 to9), (2017)**

List of Selected Publications

10. S. Mohanty, T. N. Maity, S. Mukhopadhyay, **S. Sarkar**, N. P. Gurao, S. Bhowmick, K. Biswas. "Powder Metallurgical processing of Equiatomic AlCoCrFeNi High Entropy alloy: Microstructural and Mechanical Properties". ***Materials Science and Engineering A*, 679 299-313, (2017)**

11. Manisha Mondal, Vineet Kumar Rai, Chandan Srivastava, **Suman Sarkar**, Akash R: "Enhanced frequency upconversion in Ho3+/Yb3+/Li+ : YMoO4 nanophosphors for photonic and security ink applications". ***Journal of Applied Physics, 120, 233101*, (2016)**

12. C.S Tiwary, S. Kishore, **S. Sarkar**, D.R. Mahapatra, P.M. Ajayan, K. Chattopadhyay "Morphogenesis and mechanostabilization of complex natural and 3D printed shapes, ***SCIENCE ADVANCES*, Vol 1, no. 1, e1400052 (2015)**

Articles under Review, March 2020

1. Varinder Pal, Rakesh Das, Rushikesh Ambekhar, Avinash kumar, Jitesh Vasavada, Banty Kumar, Gour Gopal Roy, Sujoy Kumar Kar, **Suman Sarkar**, Mithun Palit, Ajit K. Roy, Manas Paliwal, Krishanu Biswas, Sanjit Bhoumik, Sushil Mishra, Chirodeep Bakli,Chandra Shekhar Tiwary , "Nature-inspired Tough and hard Liquid-phase reinforced Metal matrix (LMM) composite with negative coefficient of thermal expansion" ***Nature*, (Submitted, 3rd March, 2020)**

2. Aanchna Sharma, G. Balaganesan, Fayaz Sofi, Vinod Kushvaha and, **Suman Sarkar,** "Effect of nano silica as a secondary reinforcement on tensile, flexure and ballistic impact in glass fiber reinforced epoxy composites", ***Thin-Walled Structures*** (**Submitted, 23rd January, 2020)**

Patent Filed

Title: COPPER BASE ALLOYS WITH HIGH STRENGTH AND HIGH CONDUCTIVITY AT HIGH TEMPERATURES AND A METHOD FOR PRODUCING THE SAME

Investigators: Prafull Pandey, **Suman Sarkar**, Surendra K. Makineni, Chandan Srivastava and K. Chattopadhyay, ***Indian Institute of Science, Bangalore***

Application Date: 26th September, 2019

Patent Application Number: 201841036871 (Indian)

Monograph Publication

1. **Swachhata Pakhwada: An Earnest Participation by IIT Jammu**, Web-Media, Swachh Bharat Mission

List of Important Conference Presentation

1. "Microstructural Template Consisting of a Face-Centered Cubic Matrix with Ordered Precipitates: Microstructural Evolution and Properties": **Suman Sarkar**, Prafull Pandey, Surendra Kumar Makineni, Kamanio Chattopadhyay, 2020 ***TMS Annual Meeting & Exhibition*, February 23-27, (2020) | San Diego, California, USA**

2. ***Invited Speaker**, ***12th Asia Pacific Microscopy Conference & XL (40th) Annual Meeting of EMSI*, Hyderabad, India, 03-07, February, (2020)**
   Title: Strange Photo Induced Actuation Response of Co-Ni-Al Based Ferromagnetic Shape Memory Alloys: An Electron Microscope Study

3. Studies on effect of temperature on the Photo Induced Micro-Actuation effect of a Co-based FSMA system: **Suman Sarkar**, Abhishek Bagchi, Sandip Bysakh, Susenjit Sarkar and P. K. Mukhopadhyay, ***International Conference on Ferromagnetic Shape Memory Alloys*, June 2-7, Prague, Czech Republic, (2019) | *Invited Speaker**

4. **Suman Sarkar***, Abhishek Bagchi, Sandip Bysakh, Susenjit Sarkar and P. K. Mukhopadhyay, "Microstructural Evolution and Ferromagnetic Shape Memory Response in Rapidly Solidified Co-Ni-Al Alloys**", *NMD-ATM, Kolkata* (2018) | *Contributory Speaker**

5. **Suman Sarkar***, Shyam Kanta Sinha, Chandan Srivastava, K. Chattopadhyay, "Development of new class of high strength and high conductivity copper alloy using immiscibility route in Cu-Fe-Si system: An insight to the microstructure-property correlation through microscopy". ***NMD-ATM, IIT Kanpur* (2016) | *Contributory Speaker**

Sponsored Project Handled

1. **Title of Research Proposal:** Topology controlled direct-ink 3D printed hybrid structure with the high impact resistance
   Funding Agency: Armaments Research Board, DRDO, New Delhi, Govt. of India
   Tentative Budget: 30 Lacks INR
   Role: CO - Principal Investigator (Suman Sarkar, IIT Jammu)
   Duration: 3 years **(2020-2023)**

2. **Project Theme:** Development of light operated micro-actuator using photomechanical actuation of specific alloys
   Sponsoring Agency: Department of Science and Technology (DST) Government of India
   Role: Scientist C, TRC, S. N. Bose National Centre for Basic Sciences, Kolkata, India
   Period: (2017-2019)

3. **Project Theme:** High Strength and High Conductive Cu base alloy Development for Rocket Liner application
   Sponsoring Agency: Indian Space Research Organization (Space Technology Cell)
   Role: Co-Investigator, Indian Institute of Science, Bangalore
   Amount: 20 Lacks,
   Period: (2015-2017)**, Status:** Completed

Administrative and Facility Development Activities

At IIT Jammu, India, 2019-Till

Department of Materials Engineering and Central Instrumentation Facility (CIF), IIT Jammu

SL No.	Activity	Role	Budget Involved
1	**HR-TEM Lab** Installation Process at CIF-Paloura, IIT Jammu	(i) **Expert** Member for Purchase Finalization Committee (PFC) (ii) Technical supervision of the entire procedure	2.5 Cr (INR)
2	**TEM Sample Preparation Facility** Development at CIF-Paloura, IIT Jammu	(i) **Buyer** of the Facility on behalf of CIF. (ii) Member of Purchase Finalization Committee (PFC). (iii) Technical supervision of the entire procedure.	3 Cr. (INR)
3	**Raman Spectroscopy Facility** Development and Installation at CIF-Paloura, IIT Jammu	(i) Expert Member for Purchase Finalization Committee (PFC)	2.5 Cr (INR)
4.	**Thermal Analysis Facility** Development (DSC/DTA/TGA) at CIF-Paloura, IIT Jammu	(i) **Buyer** of the Facility on behalf of CIF. (ii) Member of Purchase Finalization Committee (PFC). (iii) Technical supervision of the entire procedure.	0.5 Cr (INR)
5.	**Committee Member** (Department Under-Graduate and Post Graduate Committee)	**Course Content** Finalization for UG Students, Department of Materials Engineering, IIT Jammu	NA
6.	**Committee Member**	**Departmental UG Lab Facility**, Department of Materials Engineering, IIT Jammu	NA

Outreach Activity at IIT Jammu, India

Coordinator: Ek Bharat Shereshta Bhatar **(EBSB)**, Indian Institute of Technology Jammu

Faculty Coordinator: Institute **Drama Club**, Indian Institute of Technology Jammu

Member: Unnat Bharat Abhiyan **(UBA)**, Indian Institute of Technology Jammu

Administrative and Facility Development Activities

At Technical Research Centre, S. N. Bose National Centre for Basic Science, DST, Kolkata, India, 2017-2019

- **Supervision and Installation In-Charge –** RF Induction Melt spinning Furnace, **Facility Developed for Advanced Alloy Research at Technical Research Centre, S. N Bose National Centre for Basic Sciences, (DST Govt. India), Kolkata**
- **Scientist In-Charge, Microscopy Facility Installation**, TRC S.N. Bose National Centre for Basic Sciences, Kolkata, India

Conference / Workshop Organized

2020

Conference Organized: Convener, "*International workshop on Next five years of alloy development, solidification, and electron microscopy",* **21-22 March 2020**, Gangtok, India

2019

Industry-Academia Meet-2019: Scientist In-Charge, Technical Research Centre, S. N Bose National Centre for Basic Sciences, (DST Govt. India), Kolkata, India

2015

"Relative Strain analysis from HRTEM images: A hands on training on GPA script". 4^{th}-6^{th} December, 2015, Department of Materials Engineering, IISc Bangalore

2009

Convener, 22^{nd} Annual Student Symposium, Dept. Materials Engineering, IISc, Bangalore

Membership/Fellowship of Professional Societies

- Electron Microscope Society of India (Life Member)
- Indian Physical Society (Life Member)

Grants and Awards

- MHRD Research Scholarship, Indian Institute of Science, Bangalore, India, **2006-2015**
- CSIR (Council of Scientific and Industrial Research, Govt. of India) Diamond Jubilee Research Interns Awards, **2005**
- National Scholarship winner for higher secondary examination, **2000**

Personal Details

Date of Birth: 1st August, 1983
Nationality: Indian
Sex: Male
Marital Status: Single
Language Proficiency: English, Hindi, Bengali

Declaration:

I declare that I have maintained the truthfulness of above information to the best of my knowledge and self-belief. References can be made available on request.

Suman Sarkar