Dr. Shweta Shukla

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A **corrosion science engineer**, doctorate from Indian Institute of Technology, Bombay in Metallurgical Engineering and Materials Science and having total work experience of 3.5 years. Major experience lies in **heat treatment designing via thermo-prisma, and corrosion studies particularly stress corrosion cracking and hydrogen embrittlement.** Additionally, I am eager to explore the other areas of electrochemistry like batteries, fuel cells.

Area of Expertise

- Corrosion Science
- Failure analysis
- Material Selection
- Physical Metallurgy
- Mechanical Metallurgy

Laboratory skills

- Potentiostat
- SEM, XRD and TEM
- GDOES, DTA, DSC, TGA

Computational tools

- Thermocalc, Prisma
- Factsage
- MATLAB

Achievements

- Journal Publications: 7
- Reviewer in Corrosion Science (2024) and Metallurgical and Materials Transaction A (2023)

Awards/Honours

- **NACE Foundation Scholarship** by National Association of Corrosion Engineers, International Foundation (2021)
- Student Chairman of NIGIS (2021-2022)
- Recipient of **Summer Research Fellowship Programme** 2013 jointly organized by IASc (Bangalore) - INSA(New Delhi) - NASI(Allahabad)

Past Professional Experience

Assistant Professor
National Institute of Advanced Manufacturing Technology (April 2022 –Sept 2024)

- Courses taught - Advanced iron and steel making (M Tech); Iron making (B Tech); Metal joining processes (M Tech), Heat treatment Technology (B Tech)

Researcher (Surface Engineering Group)
R&D, Tata Steel, Jamshedpur (August 2016 – Jan 2018)

- Project: Modelling of Internal-External Oxidation of high strength DP steels during annealing
- Involved in customer support regarding defect analysis of continuous galvanizing line

Academic Background

- PhD, Materials Science, CGPA: 9.7, IIT Bombay (2022)
- M.Tech, Materials Science, CGPA: 9.61, IIT Bombay (2016)
- B Tech, Metallurgy, CGPA: 9.44, NIT Raipur (2014)
- HSC 85.2% (2010), SSC 86.83% (2008), CBSE Board

Doctoral Thesis

On the Mechanistic aspects of Environmental Assisted Cracking Behavior of high strength aerospace Al-Mg-Zn-Cu alloys

Supervisors: Prof V.S Raja and Prof. Jaya Nagamani Balila
Application: Designing heat treatments for achieving higher elongation and environmentally assisted cracking resistance

Description:

- Determining heat treatment parameters using TC-prisma to achieve different matrix precipitates dominant microstructure
- Undermining the role of matrix precipitates towards hydrogen evolution by cathodic polarization studies
- Understanding the hydrogen interaction with different kind of precipitates and their consecutive dislocations via work hardening parameters, dislocation density calculation (XRD) and TEM
- Analysing the strain/dislocation distribution over the alloy surface as per microstructure in presence of hydrogen via EBSD (KAM analysis)

Peer-reviewed International Journal

2023 ***Shweta Shukla***, N. Jaya Balila, V S Raja, "Micro-mechanisms of deformation accommodation in AA 7050 alloy in the presence of hydrogen", DOI: 10.1016/j.jallcom.2023.169596, **Journal of Alloys and Compounds: IF - 6.371, 947, 169596**

2023 ***Shweta Shukla***, N. Jaya Balila, V S Raja, "Role of GP II zones and metastable -η' precipitates on the environmentally assisted cracking behavior of AA 7050 alloy", **Metallurgical and Materials Transaction A: IF – 2.8, 54A, 4481**

2023 Markush Bakhla, ***Shweta Shukla***, Binod Kumar, "Effect of electrode composition over performance of dissimilar stainless-steel welds", **Materials today Proceedings : IF – 2.59**

2022 ***Shweta Shukla***, N. Jaya Balila, V S Raja, "Understanding the role of matrix precipitates on the environmentally assisted cracking behavior of AA 7050 alloy", DOI: 10.1016/j.corsci.2022.110281, **Corrosion Science**: **IF-7.72, 201, 110281**

2021 Mangesh D Pustode, Purnendu Chakraborty, Bharat Padekar ***Shweta Shukla***, V. S. Raja, "Hot salt stress corrosion cracking study of selective laser melted Ti-6Al-4V alloy", DOI: 10.1007/s11665-021-05774-5, **Journal of Materials Engineering and Performance**: **IF-1.82**

2018 M. Ajay Krishnan, V.S.Raja, ***Shweta Shukla***, S.M.Vaidya, "Mitigating Intergranular Stress Corrosion Cracking in Age-Hardenable Al-Zn-Mg-Cu Alloys", **Metallurgical and Materials Transactions A**: **IF-2.8**

2018 Avik Mondal, Arup Kumar Halder, Soumilya Nayak, Amrendra Kumar, Anindita Chakroborty, ***Shweta Shukla***, Rajesh S. Pais, Monojit Dutta, "Root cause analysis of an uncommon surface defect on galvannealed steel sheet", **Engineering Failure analysis**: **IF-3.63**

Key Research Projects

Industrial Modelling Project: **Prediction of Internal-External Oxidation of steels during annealing**

Purpose: Elimination of external oxides over DP-400 and 600 steels
Description: Successful development of Kinetic model of generalized binary & ternary diffusion system using finite element method via C++ coding. Thermodynamic parameters have been determined using Factsage

M Tech Project: Development of a new heat treatment to achieve combination of higher strength and Stress Corrosion Cracking resistance of Al-Zn-Mg-Cu alloy

Supervisor: Prof V.S Raja
Outcome: **Heat Treatment adopted by M/S Godrej Industries Pvt. Ltd.**
Description: Optimization of Strength – SCC relationship of 7050 alloys through secondary ageing. Heat treatment has been found to increase strength by 14% and elongation by 22% at strain rate of 10^{-7} s^{-1} with enhanced SCC resistance.

B Tech Project: Informatics on Copper added SUS 304H Austenitic Stainless Steel (Funded by IEI)

Supervisor: Dr. Subhash Ganguly
Description: Determination of relative contribution of Cu (54.24%), time (20%) and temperature (29.6%) on hardness using rough set theory approach (Rosetta tool).

- Generated rules with ~ 89 % accuracy showing influence of Cu addition on creep behaviour

International conferences

2022 Shweta Shukla**,** Balila Nagamani Jaya, and ***V S Raja***, **"**Understanding the influence of GP II and η' on the environmentally assisted cracking behavior of AA 7050 alloy in cathodically charged NaCl solution", **EUROCORR-2022** (Presentation)

2021 ***Shweta Shukla,*** Rahul Agrawal, N Jaya Balila, V S Raja, "Effect of 3.5 wt.% NaCl and cathodic charging on the deformation behavior of interruptedly aged AA 7050 alloy", 21st **ICC INTERCORR WCO** (Presentation)

2016 Vaibhav Doiphode, M. Ajay Krishnan, ***Shweta Shukla*** and V.S Raja, "Effect of multi-stage solution treatments on the SCC behavior of Al-Zn-Mg-Cu alloy in 3.5 wt. % NaCl Environment", **17th Asian Pacific Corrosion Control Conference** (Presentation)

2016 Marina Polykova, Mikhail Chukin, ***Shweta Shukla***, and V.S. Raja, "Peculiarities of corrosion resistance for carbon steels with ultra-fine grain structure", **17th Asian Pacific Corrosion Control Conference** (Proceedings)

2016 ***Shweta Shukla***, M. Ajay Krishnan, V.S Raja, "Influence of modified non-conventional temper on SCC behavior of AA 7050"**, International Conference and Technology Meet on Military and Marine Applications** (Proceedings)

National Conferences

2022 Abhijeet Joshi, ***Shweta Shukla***, Gourav Rao, V.S. Raja, "Electrochemical Corrosion Studies Behavior of a Non-equiatomic $Fe_{50}Mn_{30}Co_{10}Cr_{10}$ High Entropy Alloy in Sulphuric Acid Medium", **National Symposium on electrochemical science and technology** (Presentation)

2021 ***Shweta Shukla***, V. S. Raja, "Optimization of interrupted ageing cycle for Al-Zn-Mg-Cu alloys", in **NMD ATM -2020** (Presentation)

Other responsibilities

- Supervisor of 3 B Tech groups, working on corrosion of dissimilar austenitic-ferritic welds and ice cooled forged ferritic alloys (2022-2023)
- Mentored two MTech students, worked on High entropy steels and Crack initiation in Al alloys
- Content Developer: Mock papers & question sets for GATE in Career Avenues (2019-2021)
- Student Technical Manager of 17th Asian Pacific Corrosion Control Conference (2016)
- Joint Secretary PG of Metals and Materials Association (MMA), IIT Bombay (2015-16)
- Student Companion Coordinator, Institute Student Companion Program, IIT Bombay (2015-16)
- Designing head and Executive Member of Metallurgical Society (METSO), NIT Raipur (2011-14)