

# Curriculum Vitae

**Dr. Shashi Bhushan Arya**

**Associate Professor**

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## PROFESSIONAL EXPERIENCES

- Associate Professor (2023-): Dept. of Metallurgical and Materials Engg., (MME), NIT K
- Assistant Professor Grade-I (2018-2023), MME, NITK
- Assistant Professor (Grade II, 6000-7000) 2010-2018: MME, NITK
- Lecturer (2008-2010): MME, NITK
- CSIR-Senior Research Fellow (2003-2008), worked at Dept. Corrosion Science and Engg. IIT, Bombay (2003-2008).
- One-year graduate apprentice at Hindustan Aeronautics Ltd. (HAL) 2001-2002

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## AREA OF SPECIALIZATION

Corrosion and Metallic passivation, thermal barrier coatings (TBC), Metallic biomaterials, Anti-corrosion and antimicrobial Nano-composite coatings, Li-ion battery degradations, Corrosion of metallic artifact, utilization of industry waste

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## EDUCATION

- BTech (Metallurgical and Materials Engg.): Malviya National Institute of Technology (MNIT) Jaipur, Rajasthan., India
- PhD (Corrosion Science and Engineering): Indian Institute of Technology Bombay, Mumbai

[Advisors: **Prof. V.S. Raja (Institute Chair Professor)** and **Prof. AN Tiwari**, Metallurgical Engg., and Materials Science, IIT Bombay, Mumbai]

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## ACADEMIC ACHIEVEMENTS

1. Direct-Senior Research Fellowship (SRF) from (CSIR) New Delhi and GATE
2. **Best poster award:** International Symposium on 'Advanced Stainless Steels' 2007, IIT Madras, Chennai
3. **International travel grants (\$ 500) award: ECS 209th Meeting 2007, Electrochemical Society', USA.**
4. **Best poster award:** NMD-ATM 2009, Indian Institute Metal (IIM) Kolkata
5. **Best poster award:** CORCON (NACE, USA) 2013, New Delhi
6. **Best oral award:** NMD-ATM 2013, Varanasi
7. **Best paper award:** Int. Conf. on Emerging Trends in Materials and Manufacturing Engineering, NIT Tiruchirappalli-2017
8. **Best poster award:** International Conference on "Expanding Horizons of Technological Applications of Ceramics and Glasses" (EH-TACAG'17), 14-16 December 2017 at Pune.
9. **Best Research paper award:** CORCON (NACE, USA) 2019, Mumbai
10. **Best poster award:** Int. Conference on Corrosion and Coatings (i3C), 2022, Jamshedpur

11. **Outstanding reviewers:** Journal of Petroleum Science and Engineering and Tribology International (Elsevier)

12. Executive board member of Indian Thermal Spray Society  
<http://www.inscience.in/ITSS.html>

13. Editorial advisory board member of Int. Journal of Anti-Corrosion Methods and Mat. (UK)

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## CURRENT RESEARCH INTERESTS

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- Flow accelerated corrosion (FAC) of API steel and stainless steel at different piping joints for petroleum industry (oil filled fluids, particles, and gaseous effect: Simulations and modelling).
  - Development of new type of top-coats (thermal barrier coating) for high temperature oxidation, hot corrosion, and erosion.
  - Development of Ti alloy foams to minimise stress shielding effect for biomedical applications.
  - Influence of mineral admixtures on the corrosion properties of Steel-Concrete Interface of reinforced concrete under marine environment (use of industry wastes: blast furnace slag and fly ash etc).
  - Corrosion-wear and Fretting corrosion behaviour of bio-implant materials (Ni free SS and Ti alloy and Mg alloy).
  - Development of low-cost nano-composite marine paints for corrosion and antifouling applications
  - Role of metallic passivity on corrosion and oxidation of High entropy alloy
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## Guidance (PhD, MTech, MTech by research, and BTech)

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- **PhD (Completed)**
  1. Synthesis and development of  $\text{Sm}_2\text{SrAl}_2\text{O}_7$  based air plasma sprayed ceramic thermal barrier coatings: oxidation, hot corrosion, and high temperature erosion study.
  2. Determination of Engineering Properties of Steel-Concrete Interface of Reinforced Concrete Exposed to Corrosive Marine Environment.
  3. Study of flow accelerated corrosion of carbon steel Pipeline in oilfield environment.
  4. Development and characterization of biomedical porous Ti-Nb-Ag alloy through powder metallurgy method.
  5. Development of  $\text{Al}_2\text{O}_3+\text{Sm}_2\text{SrAl}_2\text{O}_7$  composite TBC and role of surface modification on oxidation, hot corrosion, and erosion.
- **Master students:** 55 [MTech. Research (01) and MTech (54)]
- **Under graduate (BTech):** 46

**Ongoing students:** PhD: 6 [Regular (4), QIP and external] MTech (03), BTech (04)

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## FUNDED RESEARCH PROJECT

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- (1) DST-SERB start-up grant award of about Rs 20 Lakhs to work on “corrosion and impedance study of Ti alloy for biomedical applications”.
  - (2) A Seed grants Rs. 5 Lakhs from NITK Surathkal to work on role of surface roughness on corrosion of stainless steels.
  - (3) Science and Heritage research initiative (SHRI), DST on “In-situ Corrosion behaviour of Metallic artefacts (Iron Pillar located at Kodachadri Hill) in coastal regions” Rs. 30 Lakhs (approved, Funds yet to received)
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## REVIEWERS

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- Reviewer (27 highly reputed international journals) such as Scientific Reports, Corrosion Science, Corrosion Engg, Sci. & Tech, Tribology International, Journal of Electrochemical Society, Wear, Ceramics Int, Surface coating and tech. European ceramics, Materials Engg and performance, Metallurgical and Materials Transactions A, Biomedical Materials, JOM, Trans-IIM, J. of Petroleum Science and Engg., Pressure Vessels and Piping etc.

- **Reviewer of research projects proposal of SERB for Early career research (ECR), Extra Mural Research (EMR) and Overseas Postdoctoral fellowship (SERB-OPDF) from Dept. of Science & Technology (DST), Govt. of India,**

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## **INVITED LECTURES DELIVERED**

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1. Invited Lecture on “Hot Corrosion of Thermal barrier coatings” at 12<sup>th</sup> Asian Thermal Spray Conference (ATSC), IIT Madras during November 2-4, 2023.
2. Invited lecture at Technical Symposia of “Corrosion in Power Plants and Utilities” CORCON-2023 Asia Largest Conference on Corrosion organized by The Association for Materials Protection and Performance (AMPP), previously known as NACE International, at Mumbai during October 25-28, 2023
3. Invited lecture at Dept. of **Mechanical Engineering, IIT Madras, Chennai**, 25<sup>th</sup> July 2023.
4. Guest lecture at **Saint Gobain Research India, IIT Madras Research Park**, 25<sup>th</sup> July 2023.
5. Invited lecture at Two-day Workshop and Training Program on “Advances in Corrosion Technology and Prevention (ACTP-2023), **CSIR-Institute of Minerals and Materials Technology, Bhubaneswar**, 20<sup>th</sup> July 2023.
6. Invited lecture at School of Applied Sciences, Kalinga Institute of Industrial Technology (**KIIT) Bhubaneswar**, 21st July 2023.
7. Invited lectures delivered on “Fundamentals of Corrosion Engineering and Pipeline corrosion” at Training on "Gas Transmission & Distribution Piping Systems" ‘organized by **GAIL Training Institute (GTI), Noida**, June 6<sup>th</sup> 2023 (online).
8. Invited lectures delivered on ‘Corrosion Inspection, Monitoring & Testing’ and Corrosion protection under the workshop on “Basic corrosion and mitigation methods” organized by **AMPP India Chapter** (Formerly NACE International India Section) VIRTUAL EDUCATIONAL TRAINING PROGRAM).
9. Invited lecture on “Building TRUST against RUST” at Mangalore, organized by The **Institution of Engineers (India), Mangalore Local Centre**, February 2023.
10. Invited lecture on “high temperature corrosion” at **1<sup>st</sup> National Thermal Spray Conference (NTSC -2023) at Jodhpur**, February 2023.
11. Invited lecture in FDP on Nanotechnology at **Jyothi Engineering College Thrissur**, Kerala, Jan-2023.
12. Invited lecture delivered in MET+HTS 2022 conference organised by **ASM International India Chapter in Mumbai 3<sup>rd</sup> Nov, 2022, Mumbai**.
13. Delivered invited lecture on Materials and corrosion characterization techniques at Two Days Workshop on “Non-Destructive Testing Techniques and Repair Material Characterization (NRMC-22)” funded by DST – SERB, organized by the Dept. of Civil Engg., NIT Karnataka, Surathkal (4<sup>th</sup> November 2022).
14. Invited lecture on “Corrosion Monitoring and Inspection” at One-Week STTP on Processing and Characterization of Materials (PCM 2022) organized by Dept. of Metallurgy, Govt. Engg. College, Gandhinagar (September 2022).

15. Invited lecture in the symposium on “Failure and Preventive Maintenance of Machineries (FPMM -2022)” organized by at CSIR- CSIR-Central Mechanical Engineering Research Institute, Durgapur during March 2022.
16. Invited lecture on “Piping Materials: Metallurgical design and microstructural relationship” at Online FDP, Drafting and Analysis of Industrial Piping System” GIDC Degree Engineering College Abrama, Navsari, Gujarat March 2022 (Virtual mode).
17. Expert lecture “The role of Corrosion Engineering from a Chemical Engineering Perspective” Dept. of Chemical Engg., Pandit Deendayal Energy University (PDEU), Gandhinagar, Gujrat, March 2022 (Virtual mode).
18. Invited lecture “Corrosion and Tribo-Corrosion Behaviour of Metallic Biomaterials: Porous Alloy” at One Day National Workshop, organized by Dept. of Mechanical Engg. IIT BHU, February, 2022 (Virtual mode).
19. Invited lecture “Development of coatings for high temperature applications: Oxidation and hot corrosion” Indo-US Symposium for Enhancing Fire Safety in Built-Infrastructure, jointly organized by Dept of Civil Engg. IIT Delhi and Michigan State University (MSU), USA, December 2021 (Virtual mode).
20. Webinar on Metallic Passivity—the key to transform localised corrosion problem in engineering materials” at Center of Excellence, “Metallurgical Engineering”, Dept. of Mechanical Engg, CMR Institute of Technology, Bangalore, September 2021(Virtual mode).
21. Invited lectures at AICTE Training and Learning (ATAL) Online Faculty Development Programme (FDP) on “Development & Characterization of Metallic foam for Biomedical Applications” Organized by Dept. of Mechanical Engg., GIDC Degree Engineering College Abrama, Navsari, Gujarat, September 2021 (Virtual mode).
22. Invited lectures at AICTE Training and Learning (ATAL) Online Faculty Development Programme (FDP) on “Corrosion and Metallic Passivation of Ultrafine grained Mg Alloy” Organized by Dept. of Mechanical Engineering, JNN College of Engineering, Shivamogga, Karnataka (2<sup>nd</sup> September 2021) (Virtual mode).
23. Webinar on “corrosion awareness” at Department of Mechanical Engineering, RV Institute of Technology and Management, Bengaluru, May 2021, (Virtual mode).
24. Five-day Short-Term Course (STC) on “Process Design and Development: Transformation of Industry” organized by Dept. of Chemical Engineering, Manipal University Jaipur in association with Indian Chemical Council (ICC), Indian Institute of Chemical Engineers (IChE), February 15-19, 2021 (Virtual mode).
25. Short term training program on “Advances in Corrosion Engineering and Electrochemical Characterization” (Jan., 2021), NIT Raipur (Virtual mode).
26. Short-term course on “**Emerging materials: properties, applications and Characterization**” at Dept. of Metallurgical and Materials Engineering, **MNIT Jaipur** (Virtual mode).
27. Workshop on “Advanced Nanomaterials & their applications” at National Institute of Technology, Manipur, November, 2020 (Virtual mode).
28. Faculty Development Program in the field of “Advances in the field of Mechanical and Materials Engineering” (Dec 2020), Shri Madhwa Vadiraja Institute of Technology and Management (SMVITM), Udupi, Karnataka (Virtual mode).
29. Webinar series on Processing and Characterization of Materials (PCM 2020) organized by Govt. Engg. College, Gandhinagar and IIM Baroda Chapter (Virtual mode).
30. International Conference on “Emerging Smart Materials in Applied Chemistry” (ESMAC-2020) KIIT University, Bhubaneswar (Virtual mode).
31. One day lecture in corrosion awareness, Organized by Saintgits College of Engineering, Kottayam, Kerala (Virtual mode).

32. **Denmark Technical University (Dept. of Mechanical Engineering), Lyngby, Denmark**
33. IMMT Bhubaneswar [(Protection of On-Shore and Off-Shore Facilities against Corrosion in the Coastal Region: (OFCCR-2020)]
34. Bhabha Atomic Research Centre at “Int. conf. on Electrochemistry for Industry, Health and Environment” (EIHE 2020), Dept. of Atomic energy (DAE) Mumbai,
35. Indira Gandhi Centre for Atomic Research (IGCAR), Kalapakkam Dept. of Atomic energy (DAE), India
36. Indian Institute of Technology (IIT) Delhi (Dept. of Applied Mechanics).
37. Indian Institute of Technology Hyderabad (Dept. of Materials and Metallurgical Engg.).
38. Indian Institute of Technology BHU, Varanasi (Dept. of Metallurgical Engg.).
39. VNIT Nagpur (Dept. of Metallurgical and Materials Engg.).
40. VIT University, Vellore (Mechanical Engineering).
41. National Symp. on Biomaterials, Drug Delivery and Regenerative Engg. (NSBDR-2019) MIT Manipal (Biomedical Engg.)
42. National conf. on “Industrial coatings” at IMMT Bhubaneswar (2019)
43. Int. conf. on Design, Materials & Manufacture (IcDeM 2018), NITK Surathkal.
44. Int. workshop on nanostructured marine coatings (WNMC-2016), Manipal Uni., Jaipur.
45. Indian Railways [Coaches and Wagons Works Perambur, Chennai]
46. Bhushan Steel Ltd, Angul, Orissa
47. VEDANTA, Hindustan Zinc Ltd. (Debari Plant, Chittorgarh, Rajasthan)]
48. VEDANTA, Hindustan Zinc Ltd. (Chandaria plants, Udaipur, Rajasthan)]
49. Mangalore Chemical fertilizer (MCF) Mangalore, (organized by The Institution of Engineers (IE-India)-Mangalore chapter.
50. Refresher Course on Repairs and Maintenance of Buildings, Civil Engg., NITK
51. Short term course, MME, NITK Surathkal.

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## **PUBLICATIONS (INTERNATIONAL JOURNALS)**

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1. Syamkumar K, Narendra B, Sumanth G, SB Arya (2023) “Hot corrosion behaviour of mullite thermal barrier coatings for marine diesel engines” *Ceramics International* (Accepted)
2. Fredy James J, **SB Arya** (2023) “Enhancement of corrosion resistance of Al<sub>2</sub>O<sub>3</sub> + Sm<sub>2</sub>SrAl<sub>2</sub>O<sub>7</sub> composite thermal barrier coatings by laser treatment” *Trans. the Indian Institute of Metals* (Springer),
3. Fredy James J, **SB Arya**, S Yadav, CP Paul (2023) “Development of laser modified alumina + samarium strontium aluminate composite thermal barrier coatings mechanical and tribological study” *Journal of Materials Engineering and Performance* (JMEP) (accepted)
4. Preethi, **SB Arya**, Vidya Shetty K (2023) “Biocorrosion Behavior of Epoxy-Based Multilayer Nanocomposite Coatings” **Journal of Bio- and Tribo-Corrosion** (Springer), Vol. 9 (3), p 45.
5. Fredy James **SB Arya** and Satish Kumar D (2023) “Isothermal oxidation characteristics of laser-treated Al<sub>2</sub>O<sub>3</sub> + Sm<sub>2</sub>SrAl<sub>2</sub>O<sub>7</sub> composite thermal barrier coatings” **Materials and Corrosion** (Wiley) Vol. 74(8), p 1169.
6. T.S. Ajmal, **SB Arya**, P. Maurya, S.M. Shariff (2022) “Effect of hydrodynamics and laser surface melting on erosion-corrosion of X70 steel pipe elbow in oilfield slurry, **Int. Journal of Pressure Vessels, and Piping**, Vol.199, p 104687.

7. Fredy James **SB Arya** and S Tailor (2022) “Hot corrosion behaviour of Al<sub>2</sub>O<sub>3</sub> + Sm<sub>2</sub>SrAl<sub>2</sub>O<sub>7</sub> composite thermal barrier coatings” **Materials and Corrosion**, Vol. 73(12), p 2004.
8. S Mubarak, D Dhamodharan, HS Byun, DK Pattanayak, **SB Arya** (2022) “Efficient photo electrocatalytic conversion of CO<sub>2</sub> to formic acid using Ag-TiO<sub>2</sub> nanoparticles formed on the surface of nano porous structured Ti foil” **Journal of Industrial and Engg. Chemistry** Vol. 113, p124.
9. Mohanraj G. T., M. R. Rahman, **SB Arya**, Ranju B, Krishnendu P., S Meena (2022) “Characterization Study and Recovery of Copper from Low Grade Copper Ore through Hydrometallurgical Route” **Journal of Advanced Powder Technology**, Vol. 33(1), p 103382
10. S Mubarak, D Dhamodharan, HS Byun, DK Pattanayak, **SB Arya** (2022) “Effective photoelectrocatalytic reduction of CO<sub>2</sub> to formic acid using controllably annealed TiO<sub>2</sub> nanoparticles derived from porous structured Ti foil” **Journal of CO<sub>2</sub> Utilization**, vol. 63, 102152
11. Shivaram M. J, **SB Arya**, Jagannath N. and B B. Panigrahi (2021) “Tribo-corrosion behaviour of biomedical porous Ti-20Nb-5Ag alloy in simulated body fluid” **Journal of Bio- and Tribo-Corrosion** (Springer), Vol. 7 (2), 1-9
12. Syam N, Addepalli, Harappa J, Ramesh MR, **SB Arya** (2021). “Effect of Mechanical Alloying on the Microstructure of CoCrNiTiMox High Entropy Alloy” **J. of Thermal Spray Tech.** Vol. 31(4), pp. 1045–1055
13. Ramesh S, Gajanan A, Nagaraj B., Ganesh A., H.S. Nayaka, **SB Arya** (2021) “Surface modification of multi-directional forged biodegradable Mg-Zn alloy by ball burnishing process: Modelling and analysis using deep neural network”, **Manufacturing Processes**, Vol. 68, 423-434
14. K. Trivedi, R. Rane, A. Joseph, and **SB. Arya** (2021) “Deposition of TiN and TiAlN thin films on stainless steel tube by cylindrical magnetron sputtering method” **Materials Performance and Characterization** 10 (1), 473-488
15. Anuj K **SB Arya**, B Majumdar, Jatin B, AK Srivastava (2021) “Corrosion studies of Hf<sub>64</sub>Cu<sub>18</sub>Ni<sub>18</sub> metallic glass in acidic and alkaline media” **Trans. Ind. Inst. Met.** (Springer) Vol. 74 (4), 949-956
16. Shivaram M. J, **SB Arya**, Jagannath N. and B B. Panigrahi (2021) “Development and characterization of biomedical porous Ti-20Nb-5Ag alloy: Microstructure, mechanical properties, Surface bioactivity and cell viability studies” **Metals and Materials Int. (Springer)**: (<https://doi.org/10.1007/s12540-020-00915-2>)
17. T.S. Ajmal, **SB Arya**, L.R. Thippeswamy, M.A. Quraishi, J. Haque (2020) “Effect of Oleic Acid Hydrazide Inhibitor on Flow Accelerated Corrosion of X70 Pipeline Steel” **Corrosion Engineering, Science and Technology** 55 (6), 487-496
18. Shivaram M. J, **SB Arya**, Jagannath Nayak and B B. Panigrahi (2020) “Electrochemical corrosion and Impedance studies of porous Ti- xNb-Ag alloy in physiological solution” **Trans. Ind. Inst. Met.** 73(4):921–928, (Springer)
19. K. Prajwal, G. L. Priyanka, Mohammed Adnan Hasan, A Carmel Mary Esther, N. Sridhara, A Rajendra, **SB Arya** & Arjun Dey (2020) “Development of reflective co-sputtered nanostructured metallic films” **Surface Engineering** 37 (3), 400-405



20. G, Sharan, Das. BB, **SB. Arya**, Shivaprasad K.N (2020) "Influence of Sample Preparation Techniques on Microstructure and Nano-Mechanical Properties of Steel-Concrete Interface", **J. Construction and Building Materials** Vol. 256, p 119242
21. Andana MS, Udaya Bhat, Majunatha, CM and **SB Arya** (2020) "Electrochemical and Exfoliation Corrosion Behaviour of Reversion Treated High Strength Aluminium Alloy" **Trans. Ind. Inst. Met.**, Vol. 73(6):1489–1495, (Springer)
22. T. S. Ajmal, **SB Arya**, K. R Udupa (2019) "Effect of hydrodynamics on the flow accelerated corrosion (FAC) and electrochemical impedance behaviour of line pipe steel for petroleum industry" **Int. J. of Pressure Vessels and Piping**, Vol. 174, p 42
23. S. Ramesh, H. S Nayaka, Sandeep S, K.R. Gopi, M.J. Shivaram, and **SB Arya** (2019) "Influence of Multiaxial Cryoforging on Microstructural, Mechanical, and Corrosion Properties of Copper-Titanium Alloy" **J. of Materials Engg. & Performance**, Vol. 28 (12), 7629-7641
24. G, Sharan; Das, BB, **SB. Arya** (2019) "Microstructural Study of Steel-Concrete Interface and its Influence on Bond Strength of Reinforced Concrete" **Journal of Advances in Civil Engineering Materials**, ASM international, Vol 8, pp 171-189 (doi:10.1520/ACEM20180133)
25. S, Ramesh; S, Aditya; A, Gajanan; M, Bhaskar; **SB Arya** (2019), Optimization of Ball-Burnishing Process Parameters on Surface Roughness, Micro Hardness of Mg-Zn-Ca Alloy and Investigation of Corrosion Behaviour" **Mat. Research Express** 6 (10), 1065
26. K. Prajwal, Arjun D, Manju S., Anuj N, A. Carmel M E, N. Sridhara, B. Yougandar, Pradeep K, **SB Arya** (2019) "Development of Multi-functional Thin Film based X-ray Intensity Filters for Space based Payloads" **JMEP**. 28 (9), 5820.
27. Gajanan Anne, M R Ramesh, H Shivananda Nayaka, **SB Arya** (2019) "Effect of combined multiaxial forging and rolling process on microstructure, mechanical properties and corrosion behaviour of a Cu-Ti alloys" **Mater. Res. Express**, 6, 056559, <https://doi.org/10.1088/2053-1591/ab0764>
28. T. Baskaran, **SB Arya** (2018) "Hot corrosion resistance of air plasma sprayed ceramic Sm<sub>2</sub>SrAl<sub>2</sub>O<sub>7</sub> (SSA) thermal barrier coatings in simulated gas turbine environments" **Ceramics International**, <https://doi.org/10.1016/j.ceramint.2018.06.234>
29. **SB Arya**, A. Bhattacharyaji and Manish Roy (2018) "Electrochemical corrosion behaviour of Ti-10V-2Fe-3Al in different corrosive media" **J. of Materials and Corrosion** <https://doi.org/10.1002/maco.201709894>
30. T. Baskaran, **SB Arya** (2018) "Influence of ceramic top coat and thermally grown oxide microstructures of air plasma sprayed Sm<sub>2</sub>SrAl<sub>2</sub>O<sub>7</sub> thermal barrier coatings on the electrochemical impedance behaviour" **Surface & Coatings Technology**, Vol. 344601.
31. Vishal Vats, Baskaran T, **SB Arya** (2018) "Tribo-Corrosion Study of Nickel Free, High Nitrogen and High Manganese Austenitic Stainless Steel" **Tribology Int.**, Vol. 119, p 659
32. Jyoti S., Baskaran T, Om Prakash, **SB Arya**, U. Ramamurthy (2018) "On the corrosion resistance of some selective laser melted alloys" **Journal of Materialia** (Published on behalf of Acta Materialia, Inc, Scopus indexed)

33. K, Rakesh; B, Srikanth; Ramesh, M R; **SB Arya**, (2018) Laser surface modification of Mg-Zn-Gd alloy: microstructural, wettability and in vitro degradation aspects." **Mater. Res. Express**, Vol. 5 (2018) p126
34. K, Rakesh; B, Srikanth; Ramesh, M R; **SB Arya**, Jana, Anuradha; Das, Mitun; B. Vamsi; A, Srinivasan; T, Ram prabhu (2018) "Effect of Zinc and Rare Earth Element Addition on Mechanical, Corrosion and Biological Properties of Magnesium" **Journal of Materials Research** (DOI: 10.1557/jmr.2018.31)
35. H Kaur, J Sharma, D Jindal, RK Arya, S K Ahuja, **SB Arya** (2018) "Crosslinked polymer doped binary coatings for corrosion protection" **Prog. in Organic Coatings**, Vol.,125, pp 32-39
36. Aman Gupta, Amit Kumar, T. Baskaran, **SB Arya** and R.K Khatirkar (2018) "Effect of heat input on microstructure and corrosion behaviour of duplex stainless steel shielded metal arc weld" **Trans. of Indian Inst. Met.**, pp 1-22
37. Baskaran T and **SB Arya** (2017) "Role of Thermally Grown Oxide and Oxidation Resistance of Samarium Strontium Aluminate based Air Plasma Sprayed Ceramic Thermal Barrier Coatings" **Surface and Coatings Technology**, Vol 326, pp 299-309
38. Gajanan Anne, M R Ramesh, H Shivananda Nayaka, **SB Arya**, Sandeep Sahu (2017), Development and properties evaluation of Mg-6%Zn/Al multi-layered composites processed by accumulative roll bonding, **J. of Materials Research**. (DOI: 10.1557/jmr.2017.176)
39. Gajanan Anne, M R Ramesh, H Shivananda Nayaka, **SB. Arya** (2017) "Investigation of mechanical and corrosion behavior of Mg-Zn/Ce/Al hybrid composite developed by accumulative roll bonding". **J. Alloys and Compound.**, (2017) 724, 146-154.
40. Gajanan Anne, M R Ramesh, H Shivananda Nayaka, **SB Arya**, (2017) "Microstructure evolution, mechanical and corrosion behaviour of accumulative roll bonded Mg-2%Zn/Al-7075 multi-layered composite" **Journal of Materials Engg. and Performance**, 26 (4), pp 1726–1734.
41. Atul M. Gatey, Santosh S. Hosmani, Carlos A. Figueroa, **SB Arya**, Rajkumar P. Singh (2016) Role of surface mechanical attrition treatment and chemical etching on plasma nitriding behavior of AISI 304L steel, **Surf. and Coat. Tech.** Vol. 304, pp 413.
42. Atul M. Gatey, Santosh S. Hosmani, **SB Arya**, Carlos A. Figueroa, Rajkumar P. Singh (2016) Plasma-Nitriding of AISI 2205 steel: Effects of Surface-Mechanical-Attrition-Treatment and Chemical-Etching" **J. Surface Engg.**, Vol. 32 (1) pp 61-68.
43. Moab Rajan Philip, Tharangattu N. Narayanan, M. Praveen Kumar, **SB Arya** and Deepak K (2014). "Self-protected nickel–graphene hybrid low density 3D scaffolds" **J. of Mat. Chemistry A**, 2, 9488.
44. D.P. Mondal, Mahesh Patel, S. Das, A.K. Jha, Hemant Jain,G. Gupta, **SB Arya** (2014) " Titanium foam with coarser cell size and wide range of porosity using different types of evaporative space holders through powder metallurgy route" **Materials and Design**, Vol 63, pp 89-99.
45. M. Soban Babu, A. Sivanantham, B. Barath Chakravarthy, R., **SB Arya**, G. Sreedhar (2016) "Enhanced photoelectrochemical water splitting behaviour of tuned band gap CdSe QDs sensitized LaB6J" **J. Nanosci. Nanotechnol.** Vol. 16 pp 1–6.



46. Vishnu R., Jiten Das, **SB Arya** and Manish Roy (2015) “Electrochemical Corrosion Behavior of ZrN Film in Various Corrosive Fluid” *Int. Journal of Surface Engineering and Interdisciplinary Materials Science (IJSEIMS)*, 3(1) pp 122-130
  47. T. Baskaran, G., Sreedhar, **SB Arya** (2015) “Hot corrosion stability of double perovskite and pyrochlore in sulphate solution of Vanadates or chlorides at 900 °C” **Mat. Sci. Forum**, Vol.830-831, pp 695-69
  48. **SB Arya**, V.S. Raja, and A. N. Tiwari (2013) “A Comparative Study of Semiconducting Behavior of Passive film of High Nitrogen and Ni and Mn free Stainless Steels in 3.5 wt. % NaCl” **Advanced Mat. Research**, Vol 794, pp 626-6
  49. **SB Arya** and Ankit Kanaujia (2015) “EIS Study and Role of Chloride Ions Concentration & Temperature on Passivity of AZ91D Mg Alloy” **Materials Sci. Forum**, Vol 830-831, pp 647-650
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## BOOK CHAPTERS

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1. Electrochemical corrosion behaviours of nickel and manganese free high nitrogen SS, *Advances in Stainless Steels*, CRC press (2010).
  2. Electrochemical investigations on the corrosion behavior of reinforcing steel in different dosages of fly ash replaced concrete exposed to aggressive marine environment, **Sustainable Construction and Building Materials**, Springer Nature Singapore (2018).
  3. Combined effect of marine environment and pH on the impedance of reinforced concrete studied by electrochemical impedance spectroscopy, *Lecture Notes in Civil Engineering*, Springer Nature Singapore (2019).
  4. Development, Characterization, Mechanical and Corrosion Behavior Investigation of Multi-direction Forged Mg–Zn Alloy, *Magnesium Technology*, book series by Springer and TMS (2019)
  5. Electrochemical methods in tribocorrosion, *Tribocorrosion: Fundamentals, Methods, and Materials*, Elsevier (2021)
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## PROCEEDINGS (Peer reviewed manuscripts)

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1. Syamkumar K, Sumanth G, SB Arya, Narendra B “Influence of gun traverse speed on the microstructure, phase content and residual stresses of atmospheric plasma sprayed mullite coatings” 12<sup>th</sup> Asian Thermal Spray Conference (ATSC), IIT Madras, 2023.
2. Rahul Kumar Singh, **SB Arya**, Jagannatha Nayak “An Electrochemical Impedance Spectroscopy (EIS) Investigation of X70 Steel in CO<sub>2</sub> Saturated Environment Under Hydrodynamic Conditions” CORCON-23, Mumbai, 2023
3. Rahul Kumar Singh, **SB Arya** (2022) “Corrosion and Impedance Behavior of Epoxy Based Nanocomposite Coatings On Mild Steel” CORCON-22, Udaipur, 19-20 Sept 2022
4. Fredy James **SB Arya** and S Tailor (2022) “Erosion behavior of Al<sub>2</sub>O<sub>3</sub>+ Sm<sub>2</sub>SrAl<sub>2</sub>O<sub>7</sub> composite thermal barrier coatings” *Materials Today: Proceedings*
5. MP Akhil Vijay, Sunaina S Patil, DR Madhura, Anjana P Anantharaman, P Gouramma, Hari Prasad Dasari, **SB Arya** (2022) “Effect of morphology and oxidation state of nickel on diesel soot oxidation activity” *Materials Today: Proceedings* Vol. 57, pp 1865-1870

6. Shivaram M. J, **SB Arya**, Jagannath Nayak, Bharat B. Panigrahi (2020) Role of porosity on electrochemical corrosion behavior of porous Ti-20Nb-5Ag alloy in simulated body fluid" *Materials Today: Proceeding*
7. Gajanan Anne, M R Ramesh, H Shivananda Nayaka, **SB Arya (2018)**, Microstructure, mechanical and corrosion properties of accumulative roll bonded Mg-2%Zn/anodized Al-7075 composite. *Materials Today: Proceeding*
8. Gajanan Anne, M R Ramesh, **SB Arya**, H Shivananda Nayaka (2016) "Investigation of microstructure and mechanical properties of Mg-Zn/Al multi-layered composite developed by accumulative roll bonding", *Perspectives in Science*, Vol. 8, pp 104-106
9. Vinay BU, AO Surendranthan, Chopkar M, Kumar A, **SB Arya** "Electrochemical impedance spectroscopy behavior of Co-Cr-Cu-Fe-Mo high entropy alloy" *Int. Symp. on Metastable, Amorphous and Nanostructured Materials (ISMANAM-2019) at Chennai, July 2019*
10. Nidhi Singh, Jagantah Nayak, Jatin Bhatt and **SB Arya** "Electrochemical corrosion behavior of bulk metallic glass (Zr<sub>42</sub>Cu<sub>50</sub>Ag<sub>8</sub>) in artificial physiological solutions" *Int. Symp. on Metastable, Amorphous and Nanostructured Materials (ISMANAM-2019) at Chennai, July 2019*
11. Preethi, **SB Arya**, Vidya Shetty "Microbial Induced Corrosion Behavior of multilayer Nanocomposite Coatings for the marine applications" *CORCON-19, Mumbai, 23-26 Sept 2019*
12. S. C. Bali, Kalyani K. Choudhari and **SB Arya** "Study the effect of stresses (applied during the sensitization) on the low temperature sensitization of Type 304 and 304L stainless steels" *CORCON-19, Mumbai, 23-26 Sept 2019*
13. Sharan Kumar Goudar, P Kiran Ram, A Gokul, B B Das, **SB Arya**, "Bond strength and corrosion resistance of reinforced concrete exposed to simulated acidic and alkaline marine environment", *UKIERI Concrete Congress, NIT Jalandhar, Punjab, 05-08 March 2019*
14. Sharan Kumar Goudar, Das BB, **SB Arya**, "The significance of high volume GGBS on bond strength and microstructure properties of steel-concrete interface", *National Conference on Advances in Sustainable Construction Materials (ASCM) 2019, NIT Warangal, 15-16 March 2019*
15. Preethi, **SB Arya**, V Shetty "Nano Technology - A New Perspective in the Development of Bio-corrosion resistant Paint for Ship Hull" *CORCON, Jaipur 2018*
16. Sharan Kumar Goudar, Das B B, **SB Arya**, "Corrosion behavior of OPC, PPC and PSC based concretes in harsh marine environment through electrochemical impedance spectroscopy." *5th International Corrosion Prevention Symposium for Research Scholars (CORSYM 2018), IIT Madras, Chennai, India, 23-24 March 2018, pp. 129-130*
17. T. Baskaran and **SB Arya** "Fabrication of Samarium Strontium Aluminate (Sm<sub>2</sub>SrAl<sub>2</sub>O<sub>7</sub>) ceramic and deposition of thermal barrier coating by air plasma process" *International Conference on Research in Mechanical Engineering Sciences (RiMES 2017), 21-23 Dec, 2017, Manipal University, Manipal, Karnataka,*
18. T. Baskaran **SB Arya** "Evaluation of microstructural changes and thermally grown oxide growth of oxidized Sm<sub>2</sub>SrAl<sub>2</sub>O<sub>7</sub> ceramic thermal barrier coatings for gas turbine applications" *81st Annual session of Indian Ceramic Society and International conference on "Expanding Horizons of Technological Applications of Ceramics and Glasses" EH-TACAG'17, Pune 2017.*

19. Shivaram M. J., **SB Arya**, J Nayak, Bharat B Panigrahi “Influence of Ball Milling Time on Mechanical Properties of Newly Developed Porous Ti-20Nb-5Ag Alloy” 19th International Conference on Powder Metallurgy and Particulate Technology, Paris, France, 2017
20. T. S. Ajmal, T. Baskaran, K. R. Udupa, **SB Arya** “Flow Accelerated Corrosion at Type 304 SS Pipeline Elbow in Oil Field Water” National Tribology Conference 2016 “*NTC2016*”, IIT Varanasi.
21. Rakesh K Rajan , S Bontha, Ramesh, M R, Srinivasan A, Vamsi K Balla and **SB Arya** “Investigation of bio-corrosion properties of as cast Mg-Zn-Gd alloy in Hank's solution” 4th international conference on Advances in Materials & Materials Processing, (iCAMMP-IV 2016), IIT Kharagpur, India.
22. Nidhi Singh, Jagannath Nayak, Jatin Bhatt and **SB Arya** “Electrochemical impedance Spectroscopy (EIS) study of Zr<sub>42</sub>Cu<sub>50</sub>Ag<sub>8</sub> bulk metallic glass in Artificial Physiological Solutions” The 17th Asian Pacific Corrosion Control Conference, January 27-30, 2016, IIT Bombay, Mumbai, India
23. Fazil and **SB Arya** “Electrochemical Corrosion and Tribocorrosion study of 316L SS in artificial physiological solutions” The 17th Asian Pacific Corrosion Control Conference, January 27-30, 2016, IIT Bombay, Mumbai, India
24. Karegauda, Jagantah Nayak and **SB Arya** “Electrochemical Corrosion and Tribocorrosion study of Ti alloys in artificial physiological solutions” The 17th Asian Pacific Corrosion Control Conference, January 27-30, 2016, Bombay, Mumbai, India
25. Baskaran, T., Sreedhar, G., and **SB Arya**, “Hot corrosion of advanced ceramic oxides in gas turbine simulated environments at 900 °C”, CORCON 2014, Mumbai,
26. **SB Arya**, V.S. Raja and A.N. Tiwari, “Electrochemical Impedance Study of High Nitrogen, Nickel and Manganese free Austenitic Stainless Steel in Artificial Physiological Solutions” Proc. Int., CORCON -13, New Delhi, 2013
27. **SB Arya**, V.S. Raja and A.N. Tiwari “EIS study and Role of Surface Finish on the Electrochemical Corrosion Behavior of High Nitrogen, High Mn and Ni free Austenitic Stainless Steels in 3.5 wt. % NaCl Solution” NMD-ATM 2013, Varanasi
28. **SB Arya**, V.S. Raja and A.N. Tiwari, “EIS study on the influence of pH on the corrosion of high nitrogen containing stainless steels in chloride media” HNS-12, (2012), in: Kamachi Mudali et al. (Eds.)
29. **SB Arya** and V.S. Raja, “Corrosion of high nitrogen high manganese, molybdenum containing stainless steel in 3.5%NaCl and HCl solutions”, MICMEP 2006 Baroda, India.

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## CONFERENCE PRESENTATION

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1. Fredy James J, Kunal B. Bhole, S.B Arya “CMAS Hot Corrosion behavior of Al<sub>2</sub>O<sub>3</sub> + Sm<sub>2</sub>SrAl<sub>2</sub>O<sub>7</sub> composite thermal barrier coatings” National Thermal Spray Conference (NTSC -2023) at Jodhpur, February 2023
2. Syamkumar K, Sumanth G, SB Arya, Narendra B. “Influence of gun traverse speed on the microstructure, phase content and residual stresses of atmospheric plasma sprayed mullite coatings” National Thermal Spray Conference (NTSC -2023) at Jodhpur, February 2023
3. Shilajit Das and **SB Arya** “Reliability and Durability Study of Lithium-ion Battery: Electrochemical Impedance Spectroscopy Technique” International Conference on Electrochemistry in Industry, Health and Environment – 2023 (EIHE-2023), organized by

Indian Society for Electro Analytical Chemistry (ISEAC), BARC Mumbai, 7-11<sup>th</sup> February 2023.

4. Avinash Gunturu, Shilajit Das and **SB Arya** “Role of Torque Power on Lithium-Ion Battery Degradation” International Conference on Electrochemistry in Industry, Health and Environment – 2023 (EIHE-2023), organized by Indian Society for Electro Analytical Chemistry (ISEAC), BARC Mumbai, 7-11<sup>th</sup> February 2023
5. Bharadwaj Matta and **SB Arya** “Effect of lightning on metal degradation” International Conference on Electrochemistry in Industry, Health, and Environment – 2023 (EIHE-2023), organized by Indian Society for Electro Analytical Chemistry (ISEAC), BARC Mumbai, 7-11<sup>th</sup> February 2023
6. Rahul Kumar Singh, **SB Arya** and Jagannath Nayak “Electrochemical impedance spectroscopy (EIS) study of api steel under flow conditions in CO<sub>2</sub> saturated environment” International Conference on Electrochemistry in Industry, Health and Environment – 2023 (EIHE-2023), organized by Indian Society for Electro Analytical Chemistry (ISEAC), BARC Mumbai, 7-11<sup>th</sup> February 2023
7. Kunal Bhalchandra Bhole, Fredy James and **SB Arya** “Electrochemical impedance spectroscopy behavior for thermal barrier coatings integrity” International Conference on Electrochemistry in Industry, Health and Environment – 2023 (EIHE-2023), organized by Indian Society for Electro Analytical Chemistry (ISEAC), BARC Mumbai, 7-11<sup>th</sup> February 2023
8. Vinay BU, **SB Arya**, Anil Kumar, Manoj Kumar Chopkar “Electrochemical impedance spectroscopy behavior CoCrCuFeMo High entropy alloy and 304L SS” International conference on corrosion and coating, IIM Jamshedpur chapter, Jamshedpur, India, 2022
9. Rahul Kumar Singh, Yogendra Kumar, T.S Ajmal, **SB Arya**, J Nayak “Flow accelerated corrosion of API X70 steel in 3.5 wt.% NaCl solution with the addition of CO<sub>2</sub> gas” International conference on corrosion and coating, IIM Jamshedpur chapter, Jamshedpur, India, 2022
10. Fredy James J and **SB Arya**, “Enhancement of hot corrosion resistance of Al<sub>2</sub>O<sub>3</sub> + Sm<sub>2</sub>SrAl<sub>2</sub>O<sub>7</sub> composite thermal barrier coatings by laser treatment” International conference on corrosion and coating, IIM Jamshedpur chapter, Jamshedpur, India, 2022
11. Yogendra Kumar, T.S. Ajmal, Fredy James J, **SB Arya** “Flow Accelerated Corrosion of API X70 Pipeline Steel in liquid and gaseous medium”, two days international conference on “Recent Trends in Mechanical Engineering Sciences RTIMES-2022”, Srinivas Institute of Technology, Mangalore
12. **SB Arya** “Materials degradation problem for electric vehicle” 2nd Indo Japan Bilateral Symposium on Futuristic Materials and Manufacturing for Next Generation Electric Vehicles and High-Speed Railway, 2- 3 March 2020, IIT Madras, Chennai
13. Shivaram M. J., **SB Arya**, J Nayak, Bharat B Panigrahi “Electrochemical Impedance Spectroscopy and In-vitro Corrosion Behaviour of Porous Ti-20Nb-5Ag Alloy in Simulated Body Fluids, The 6<sup>th</sup> Asian Biomaterials, Trivandrum, Kerala, 2017
14. Shivaram M. J., **SB Arya**, J Nayak “Fabrication and Mechanical Properties of Porous Ti-20Nb-5Ag alloy for Biomedical Application” NMD-ATM-2017, Goa
15. T. Baskaran **SB Arya** “oxidation behavior of Sm<sub>2</sub>SrAl<sub>2</sub>O<sub>7</sub> ceramic thermal barrier coatings for gas turbine applications” NMD-ATM-2017, Goa
16. Shaheer KV, Jaganntah Nayak, and **SB Arya** “Electrochemical corrosion behaviour of high Si containing stainless steels in 3.5 wt. % NaCl Solution” NMT-ATM 2015m Coimbatore

17. **SB Arya**, V.S. Raja and A.N. Tiwari “EIS study and Role of Surface Finish on the Electrochemical Corrosion Behavior of High Nitrogen, High Mn and Ni free Austenitic Stainless Steels in 3.5 wt. % NaCl Solution” NMD-ATM 2013, Varanasi
18. **SB Arya**, V.S. Raja and A.N. Tiwari, “Electrochemical impedance studies of high N, high Mn and Ni free stainless steel in various physiological solutions” Proc. of the Conf. of Indian Inst. Metal (2010), NMD-ATM 2010, Bangalore
19. **SB Arya**, V.S. Raja and A.N. Tiwari, Katada, Y, “Electrochemical Corrosion Behaviour of High Nitrogen, Ni and Mn Free Stainless Steels in Ringer physiological Solutions” Proceedings of the Conf of Indian Institute Metal (IIM-2009), Kolkota
20. **SB Arya**, V.S. Raja and A.N. Tiwari “Electrochemical Impedance study on the surface roughness effect of high nitrogen stainless steels in 3.5 wt % NaCl and with 0.5N HCl solution”, on 7th-8th February 2008, COMME, NMRL, Ambarnath, India
21. **SB Arya**, V.S. Raja and A.N. Tiwari, “Corrosion Of High Nitrogen High Manganese, Molybdenum Containing Nickel Free Stainless Steel in 3.5 wt% NaCl and at Various pH of Aqueous Solution”, 209<sup>th</sup> Meeting (2007), ‘The Electrochemical Society’, Denver, USA
22. **SB Arya**, V.S. Raja and A.N. Tiwari “To study the effect of surface roughness on electrochemical corrosion behaviour of high nitrogen stainless steels 3.5 wt % NaCl and with various pH solution” Proceedings of the Conference of Indian Institute Metal (IIM-2007), organized by IIM at Mumbai, India, November, 12<sup>th</sup> -16<sup>th</sup>, 2007
23. **S.B. Arya**, P. Sarvanan, V.S. Raja and A.N. Tiwari, “Corrosion of high nitrogen high manganese, molybdenum containing stainless steel in 3.5 wt.% NaCl solution”, Proceedings of the Conference of Indian Institute Metal (IIM-2005), 2005, Chennai, India

## **COURSES OFFERED**

### **Theory Courses**

#### **BTech**

- (1) Heat Treatment of Metals and Alloys,
- (2) Powder Metallurgy,
- (3) Joining of Metals
- (4) Principles of Extractive Metallurgy
- (5) Process Plant Materials (Open elective for Mechanical and Chemical Engg.)
- (6) Corrosion Engineering,
- (7) Non-Destructive Testing
- (8) Mechanical Testing
- (9) Non-Ferrous Extractive Metallurgy
- (10) Composite Materials

#### **MTech**

- (1) Steel and its Heat Treatment
- (2) Corrosion Engineering
- (3) Materials Characterization

### **Laboratory Courses (Jointly handled):**

- (1) Physical Metallurgy
- (2) Metallography
- (3) Heat Treatment
- (4) Metal Finishing
- (5) Extractive Metallurgy and
- (6) Metal Processing



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## **In-house Development of Research Facilities**

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1. Tribo-corrosion setup for low load application (implant materials)
  2. Fretting corrosion set up for low amplitude
  3. Spring constant load setup for stress corrosion cracking.
  4. Surface mechanical attrition treatment (SMAT) Setup (To develop Nano crystalline microstructures of surface).
  5. Flow accelerated simulation setup for pipeline corrosion study
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## **Administrative Services**

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1. Assistant Hindi officer for the implementation of Rajbhasha at NITK Surathkal
  2. DUGC Secretary, Dept. of Metallurgical and Materials Engineering (MME), NIT Surathkal
  3. Chairman and Treasurer of Metallurgical and Materials Engineering Association (MMEA), NITK Surathkal.
  4. Secretary and Treasurer of Indian Institute of Metal, Surathkal Chapter.
  5. Faculty advisor for BTech and MTech students, Dept. of MME, NIT K Surathkal.
  6. Development of Corrosion and Tribocorrosion laboratory
  7. Executive Member for Library advisory Committee, NIT K
  8. Hostel warden (to support 600 students), NIT K Surathkal.
  9. In charge of Corrosion lab and Extractive metallurgy lab
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## **ORGANIZING EXPERIENCE**

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- (1) Chairman of Symposia ‘Young Student Scientist Forum’ CORCON 2023 organized by AMPP Asia Largest Conference on Corrosion organized by The Association for Materials Protection and Performance (AMPP), previously known as NACE International, at Mumbai during October 25-28, 2023
  - (2) Conducted two days First National thermal Spray conference (NTSC), Jodhpur, as co-convenors
  - (3) Conducted two days’ workshop on Materials processing and degradation (2016).
  - (4) Conducted two-day workshop on “Nonferrous Extractive Metallurgy” NITK, 201
  - (5) Conducted three days’ workshop on “Selected topics in Met and Mats Engg.” NITK, 2014
  - (6) Conducted an International Symposium on “Making India: Role of Metal & Materials (MIRMM-2015)”, on occasion of golden jubilee celebration of Dept. of MME NITK Surathkal, 2015
  - (7) Chaired the lecture session of International Conference on Advances in Manufacturing and Materials Engineering at NITK Surathkal, March 2014.
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## **WORKSHOP ATTENDED:**

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1. National workshop on advanced methods for “Materials Characterization” (NWMC-2004), organized by MRSI Mumbai chapter, **BARC, Mumbai, 2004**
  2. One day workshop on “Nanotechnology Application in Industries”, organized by **IRCC, IIT Bombay 2005**
  3. Two Day Workshop on “Mastering the Art and Science of Teaching Engineering and Research (MASTER)”, Organized by NITK, Surathkal and Hewlett-Packard (HP) University Relations, at **NIT K Surathkal, March- 2008**
  4. Three-day Workshop on “Electron Microscopy” Dept. of Met-Mat Engg., **NIT K Surathkal, 2008**
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5. One-week workshop on “Heat treatment of ferrous and nonferrous alloy” conducted by Dept. of Met-Mat Engg and Mechanical Engg., **NIT K Surathkal, 2009**
  6. One-week course on Advanced processing in materials conducted by Dept of Metallurgical Science Engg., **IIT Kanpur, 2009**
  7. Two-day workshop on Environmental assisted Cracking (EAC), conducted by NACE and **IIT Bombay, 2010**
  8. Two-day workshop of “Wear and erosion of power plant & industrial components” conducted by **Central power research institute, Bangalore, 2013**
  9. Three-day workshop on “Advances in Corrosion Engg.”, NRC-M, Dept. of Materials Engg., IISc Bangalore 2014
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### **Membership of Professional societies:**

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- (1) Indian Institute of Metal, Kolkata, India.
  - (2) The Electrochemical Society of India
  - (3) Tribological Society of India, Faridabad, India,
  - (4) Society for Biomaterials and Artificial Organs (India)
  - (5) Indian Thermal Spray Society, Jodhpur, India
  - (6) Electrochemical Society (ECS), NJ, USA
  - (7) National Association for Corrosion Engineers (NACE), Houston, USA
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**Shashi Bhushan Arya, PhD**

**Place: NITK Surathkal**