
Dr. Rajasekaran BALASUNDARAM

PhD (Metallurgical & Materials Engineering)



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Research Expertise

Advanced Materials Processing & Technologies

Protective & Functional Coatings:

Thermal Barrier Coatings (Bond coat & Top Coat)

Oxidation, Corrosion, Erosion

Tribological Coatings

Thermal Spray & Cold Spray Coatings Technology (APS, HVOF/HVAF, Detonation Spray)

Surface Engineering & Tribology

Materials Testing: Tensile, Fatigue

Additive Manufacturing: Bulk-near net shape & Repair

Laser and Solid-State Additive Manufacturing

Current Employment

Associate Professor,

Department of Metallurgical & Materials Engineering
National Institute of Technology, Karnataka, Surathkal
Mangalore - 575 025
INDIA

Academic Identifications:

SCOPUS ID: 23095383700

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

Education

PhD - Metallurgical and Materials Engineering (2007)

Indian Institute of Technology (IIT), Madras – INDIA

PhD Thesis: Plain and Fretting Fatigue Studies on Surface Modified Al & Ti- alloys

M.E - Materials Science & Engineering (2003)

National Institute of Technology, Tiruchirappalli – INDIA

M.Sc - Materials Science (2001)

Anna University - INDIA

Profession Experience

Period	Institution	Designation / Position
2008 -2010	Forschungszentrum (Research Center) Juelich GERMANY	Scientist
2011 – 2012	IGCAR Kalpakkam	Visiting Scientist
2012 -2013	NIT -Trichirappalli	Ad-hoc Faculty
2014 – 2016	Forschungszentrum (Research Center) Juelich GERMANY	Scientist
2017 -2018	Singapore Institute of Manufacturing Technology, A*STAR Singapore	Research Fellow
2018 -2023	NIT -Karnataka, Surathkal	Assistant Professor, Grade - I
Oct 2023 onwards	NIT-K	Associate Professor

Awards and Honours

- 1. ARCI Fellowship** (International Advanced Research Center for Powder Metallurgy and New Materials, Hyderabad, **INDIA**) for Ph.D.
- 2. Best PhD thesis award – ‘Sudharshan Bhat Memorial Prize’** in 2008 for the best Ph.D. thesis submitted in the Department of Metallurgical and Materials Engineering, Indian Institute of Technology, Madras, **INDIA**

Peer Review Activity (International Journals)

Surface & Coating Technology
Journal of Alloys and Compounds
Journal of Thermal Spray Technology
Optics & Laser Technology
Indian Institute of Metals-Transactions (IIM-Trans)

Student Guidance:

B.Tech – *Major Projects - 14 students Completed*

M.Tech – *Major Projects - 17 Students Completed*

M.Tech (Research) – *1 Student Completed*

PhD Guidance Details:

S.No	Year	Name (Roll No)	Title	Sole/Joint guidance	Status
1	2019 - 2023	Manjunath. N (197059MT004)	Studies on atmospheric plasma sprayed Mn _{1.0} Co _{1.9} Fe _{0.1} O ₄ coating on Crofer 22 APU interconnect for solid oxide fuel cells applications	Sole	VIVA completed on 27.04.2023
2	2019 - 2023	Purushotham. N (197058MT005)	The effect of temperature-dependent properties on the high temperature sliding wear behaviour of detonation sprayed Ni-based Coatings	Sole	Thesis submitted on 19.06.2023
3	From July 2021	V. Abhijith Vijay (2170126MT001)	High temperature properties of materials deposited by thermal and cold spray processes	Sole	On-going
4	From July 2021	MP. Sreerag (217005MT006)	High Velocity Air Fuel Sprayed Copper – Microstructure and Properties	Sole	On-going

LIST OF PUBLICATIONS

Refereed International Journals:

31	N Purushotham, N.L. Parthasarathi, P. Suresh Babu, G. Sivakumar, B. Rajasekaran , High temperature sliding wear behaviour of detonation sprayed Ni-5wt%Al coating (2023), Wear , (Accepted).
30	N Purushotham, K. Santhy, P. Suresh Babu, G. Sivakumar, B. Rajasekaran , In-situ high temperature X-ray diffraction study on atmospheric plasma and detonation sprayed Ni-5wt%Al coatings, (2023), J. Thermal Spray Technol. (Accepted)
29	Manjunath. N, K. Santhy, and B. Rajasekaran , "The effect of strain induced phase transformation on the thermal expansion compatibility of plasma sprayed spinel coating on SOFC metallic interconnect – A study using in-situ high temperature X-ray diffraction," Int. J. Hydrogen Energy , May 2023
28	Manjunath. N, Rajasekaran B. Characterization of Plasma Sprayed $Mn_{1.0}Co_{1.9}Fe_{0.1}O_4$ Coating on Crofer 22 APU Interconnect for Solid Oxide Fuel Cell Application (2023) Transactions of the Indian Institute of Metals , 76 (5), pp. 1263-1269
27	Purushotham N, Parthasarathi, N.L., Babu, P.S., Sivakumar, G., Rajasekaran B. Effect of thermal expansion on the high temperature wear resistance of Ni-20%Cr detonation spray coating on IN718 substrate (2023) Surface and Coatings Technology , 462, art. no. 129490.
26	Manjunath, N., Santhy, K., Rajasekaran B. Thermal expansion of Crofer 22 APU steel used for SOFC interconnect using in-situ high temperature X-ray diffraction (2023) Materials Today: Proceedings .
25	V.AbhijithVijay,K.Santhy,G.Sivakumar, B.Rajasekaran Thermal expansion and microstructure evolution of atmospheric plasma sprayed NiCrAlY bond coat using in-situ high temperature X-ray diffraction, Surface and Coatings Technology , (2023) 129132
24	Vikrant Kala, K. Santhy, G. Sivakumar, B. Rajasekaran , Understanding the Initial Stage Oxidation and Microstructural Evolution of Detonation Sprayed NiCoCrAlY Bond Coat using in-situ High-Temperature X-Ray Diffraction, Corrosion Science , 207 (2022) 110521
23	N Purushotham, B. Rajasekaran , N.L. Parthasarathi, K. Praveen, G. Sivakumar Sliding Wear Behaviour of Ni-5%Al Coating Deposited by Detonation Spray on IN718" Materials Today: Proceedings , 65(2022) 3741-3747
22	C. Sundaresan, B. Rajasekaran , S. Varalakshmi, K. Santhy, D. Srinivasa Rao, G. Sivakumar, Comparative hot corrosion performance of APS and Detonation sprayed CoCrAlY, NiCoCrAlY and NiCr coatings on T91 boiler steel, Corrosion Science , 189 (2021) 109556
21	A Röttger, SL Weber, W Theisen, B Rajasekaran , R Vaßen HVOF Spraying of Fe-Based MMC Coatings with In Situ Formation of Hard Particles by Hot Isostatic Pressing Journal of Thermal Spray Technology 21 (2 (2012), 344-354
20	B Rajasekaran , G Mauer, R Vaßen Enhanced characteristics of HVOF-sprayed MCrAlY bond coats for TBC applications Journal of Thermal Spray Technology 20 (6), (2011) 1209-1216
19	A Röttger, S Weber, W Theisen, B Rajasekeran , R Vaßen Diffusion and Phase Transformation at the Interface between an Austenitic Substrate and a Thermally Sprayed Coating of Ledeburitic Cold-Work Tool Steel Research International 82 (6) (2011), 671-682
18	A Röttger, S Weber, W Theisen, B Rajasekeran , R Vassen Mechanical properties of thermally sprayed Fe based coatings Materials Science and Technology 27 (6) (2011), 973-982
17	B Rajasekaran , G Mauer, R Vaßen, A Röttger, S Weber, W Theisen Thick tool steel coatings using HVOF spraying for wear resistance applications Surface and Coatings Technology 205 (7) (2010), 2449-2454

16	B Rajasekaran , G Mauer, R Vaßen, A Röttger, S Weber, W Theisen Development of cold work tool steel based-MMC coating using HVOF spraying and its HIP densification behavior <i>Surface and Coatings Technology</i> 204 (23) (2010), 3858-3863
15	B Rajasekaran , G Mauer, R Vaßen, A Röttger, S Weber, W Theisen Development of cold work tool steel based-MMC coating using HVOF spraying and its HIP densification behavior <i>Surface and Coatings Technology</i> 204 (23) (2010), 3858-3863
14	B Rajasekaran , G Mauer, R Vassen, A Röttger, S Weber, W Theisen Coating of high-alloyed, ledeburitic cold work tool steel applied by HVOF spraying <i>Journal of Thermal Spray Technology</i> 19 (3) (2010), 642-649
13	A Röttger, SL Weber, W Theisen, B Rajasekaran , R Vaßen High Velocity Oxy Fuel Spraying of Cold Work Tool Steels-A Novel Approach to Thick Coatings for Wear Protection Applications, <i>Advanced Engineering Materials</i> 11 (12) (2009), 1015-1022
12	B. Rajasekaran , S. Ganesh Sundara Raman, S.V. Joshi, and G. Sundararajan, Effect of grinding on plain fatigue and fretting fatigue behaviour of detonation gun sprayed Cu-Ni-In coating on Al-Mg-Si alloy, <i>Int. J. Fatigue</i> , 31, 4 (2009) 791 – 796
11	B. Rajasekaran and S. Ganesh Sundara Raman, Plain fatigue and fretting fatigue behaviour plasma nitrided Ti-6Al-4V alloy, <i>Materials Letters</i> , 62, 16 (2008) 2473 – 2475
10	B. Rajasekaran , S. Ganesh Sundara Raman, S.V. Joshi, and G. Sundararajan Effect of microarc oxidized layer thickness on plain fatigue and fretting fatigue behaviour of Al-Mg-Si alloy, <i>Int. J. Fatigue</i> , 30 (2008) 1259 – 1266
9	S. Ganesh Sundara Raman and B. Rajasekaran , Relative Performance of Alumina Coatings Prepared by Microarc Oxidation and Detonation Gun spray on AA 6063 under Plain Fatigue and Fretting Fatigue Loading, <i>Trans IIM</i> , 61, (2008), 465-471
8	B. Rajasekaran , S. Ganesh Sundara Raman, S.V. Joshi, and G. Sundararajan (2007) Performance of plasma sprayed and detonation gun sprayed Cu-Ni-In coatings on Ti-6Al-4V under plain fatigue and fretting fatigue loading, <i>Mater. Sci. Eng., A</i> , 479, 1-2, (2008) 83 – 92
7	B. Rajasekaran , S. Ganesh Sundara Raman, S.V. Joshi and G. Sundararajan (2008) Influence of detonation gun sprayed alumina coating on AA 6063 samples under cyclic loading with and without fretting, <i>Tribol. Int.</i> 41, (2008) 315 – 322
6	B. Rajasekaran , S. Ganesh Sundara Raman, L. Rama Krishna, S.V. Joshi and G. Sundararajan, Influence of microarc oxidation and hard anodizing on plain fatigue and fretting fatigue behaviour of Al-Mg-Si alloy, <i>Surf. Coat. Tech.</i> 202 (2008) 1462 – 1469
5	S. Ganesh Sundara Raman and B. Rajasekaran , Relative Performance of Detonation Gun Sprayed Cu-Ni-In and Alumina Coatings on AA 6063 under Plain and Fretting Loading, <i>Materials Science and Technology</i> 23 (12), (2007), 1471 – 1477
4	S. Ganesh Sundara Raman, B. Rajasekaran , S.V. Joshi, and G. Sundararajan, Influence of substrate material on plain fatigue and fretting fatigue behaviour of detonation gun sprayed Cu-Ni-In coating, <i>J. Thermal Spray Tech.</i> , 16(4), (2007) 571 – 579
3	B. Rajasekaran , S. Ganesh Sundara Raman, S. V. Joshi, G. Sundararajan, Effect of detonation gun sprayed Cu-Ni-In coating on plain fatigue and fretting fatigue behaviour of Al-Mg-Si alloy. <i>Surf. Coat. Tech.</i> , 201, (2006) 1548-1558
2	B. Rajasekaran , S. Ganesh Sundara Raman, S. V. Joshi, G. Sundararajan, Effect of detonation gun sprayed Cu-Ni-In coating on plain fatigue and fretting fatigue behaviour of Al-Mg-Si alloy. <i>Surf. Coat. Tech.</i> , 201, (2006) 1548-1558
1	B Rajasekaran , S Raman PLAIN FATIGUE AND FRETTING FATIGUE BEHAVIOUR OF DETONATION SPRAYED Cu-Ni-In COATED Al-Mg-Si ALLOY <i>Transactions of the Indian Institute of Metals</i> 58 (5) (2005)

International Conferences & Proceedings

1. Manjunath. N and **B. Rajasekaran** "Surface characterization of Mn_{1.0}Co_{1.9}Fe_{0.1}O₄ (MCF) spinel coating on metallic interconnect used in Solid Oxide Fuel Cells" *Springer Series: Advances in Sustainability Science and Technology* (Accepted)
2. C Sundaresan, **B. Rajasekaran**, G Sivakumar and D S Rao, Hot corrosion behaviour of plasma and d-gun sprayed coatings on t91 steel used in boiler applications, IOP Conf. Series: *Materials Science and Engineering* 872 (2020) 012092 IOP Publishing doi:10.1088/1757-899X/872/1/012092
3. N. Aruldev, N.L. Parthasarathy, **B. Rajasekaran**, Utpal Borah, High-t High-Temperature Sliding Wear Characterization Studies of AISI 316 L(N) by Surface Profilometry, Proceedings of ICDMC 2019. *Lecture Notes in Mechanical Engineering. Springer*, Singapore. (2020) pp303-320
4. **B. Rajasekaran**, G. Mauer, R. Vassen, A. Röttger, S. Weber, W. Theisen, Processing of thick cold work tool steel coating using HVOF thermal spraying and subsequent HIP densification, *Surface Modification Technologies XXIII*, (2009) 127 - 134 ISBN 978-81-910570-0-2
5. **B. Rajasekaran**, S. Ganesh Sundara Raman, S. D. Pathak, S.V. Joshi and G. Sundararajan, Plain fatigue and fretting fatigue studies on detonation sprayed Cu-Ni-In coated Ti-6Al-4V alloy. *International Symposium for Research Scholars (ISRS)* 2006, IIT Madras, Chennai, India
6. **B. Rajasekaran**, G. Mauer, R. Vassen, A. Röttger, S. Weber, W. Theisen, Processing of thick cold work tool steel coating using HVOF thermal spraying and subsequent HIP densification, *23rd International Conference on Surface Modification Technologies, India, 2 -5 NOV 2009*, pp. 13.
7. A. Röttger, S. Weber, W. Theisen, **B. Rajasekaran**, R. Vassen, Thermal Spraying of Wear Resistant Cold Work Tool Steels, In: Proceedings volume 12, *Materials Colloquium*, Chemnitz – Germany, (2009), pp.73-83
8. **B. Rajasekaran**, G. Mauer, R. Vassen, A. Röttger, S. Weber, W. Theisen, HVOF spraying of ultrahigh boron-high carbon tool steel coating for wear resistance applications, *International Thermal Spray Conference 2010 (ITSC-2010)*, May 3-5, Singapore.
9. R. Vassen, **B. Rajasekaran** and G. Mauer, HVOF Bond Coats for TBC Applications, *25th International Conference on Surface Modification Technologies, 20-22 June 2011*, Trollhättan, Sweden, S. 135 – 142.

National Conferences

B. Rajasekaran, S. Ganesh Sundara Raman, S. V. Joshi and G. Sundararajan, Plain fatigue and fretting fatigue behaviour of detonation sprayed Cu-Ni-In coated Al-Mg-Si alloy. 59th Annual Technical Meeting (NMD-ATM), Indian Institute of Metals IIT Madras Chennai, India, November 2005

BOOK Chapters:

1. **B. Rajasekaran**, G. Mauer, R. Vassen, A. Röttger, S. Weber, W. Theisen Surface Modification Technologies XXIII / Processing of thick cold work tool steel coating using HV OF thermal spraying and subsequent HIP densification Surface Modification Technologies XXIII, (2009) 127 - 134 ISBN 978-81-910570-0-2
2. **B. Rajasekaran**, G. Mauer, R. Vassen HVOF Bond Coats for TBC Applications Surface Modification Technologies XXV- ISBN: 819105714X, 9 788191057140

3. **B. Rajasekaran**, G. Mauer, R. Vassen, A. Röttger, S. Weber, W. Theisen HVOF spraying of ultrahigh boron-high carbon tool steel coating for wear resistance applications Thermal Spray Technologies ISBN-13: 978-1493951901

Funded Projects Completed/Handled as Co-PI (Co-principal investigator)

Projects at Forschungszentrum (Research Center) Jülich - GERMANY

Materials Synthesis & Processing (IEK-1), Institute for Energy & Climate Research

1. Thermal sprayed MMC coatings –**German Research Foundation (DFG)** Project – **€ 200000** - Completed
2. Development of advanced nanostructured columnar Thermal Barrier Coatings (TBCs) using **Suspension Plasma Spraying (SPS)** for gas turbines for thermal power plants –**Industry Project (€ 110000)**-Completed
3. Process development of functional multilayer - **nanostructured coatings using Suspension Plasma Spraying (SPS)** for automotive applications – **International Automotive Industry Project – (€ 15000)** - Completed

On-going funded projects:

1. Development of High Temperature Wear and Erosion Resistant Coatings for Thermal Components using High-Velocity Air Fuel (HVOF) Spraying – A Robust Cost-Effective Technology, **Funded by Central Power Research Institute-Bangalore – (Outlay INR. 56.70 Lac) From April 2023 – on-going**

International and National Research Collaborations

Forschungszentrum GmbH-Jülich, **GERMANY**

University Wuppertal, **GERMANY**

Impact Innovations, **GERMANY**

International Advanced Research Centre For New Materials (ARCI)- **Hyderabad, INDIA**

Indira Gandhi Centre for Atomic Research – **Kalpakkam, INDIA**