



Dr. George Rapheal
Mechanical & Materials Engineer

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Expertise and Research Fields:

- Corrosion testing, interpretation of results, corrosion mechanisms, Electrochemical Impedance Spectroscopy (EIS), corrosion prevention methods etc.
- Electrochemistry, Surface technology and coatings, Plasma Electrolytic Oxidation, etc.
- Study of wear mechanisms, wear testing methods, interpretation of results etc.
- Metallurgy of light metals and alloys (Al, Mg and Ti).
- Microstructural analysis by SEM, XRD, EDS.
- Surface topography analysis by AFM.
- Mechanical behaviour evaluation of materials and interpretation of test results by tension, compression, hardness, microhardness etc.
- Composite materials: Properties, production methods and mechanics.
- Advanced manufacturing technology
- Design of machine elements.
- Mechanical design, 3D modeling and Detail drawings preparation

Research areas:

Microstructural characterization, corrosion and wear behaviour of surface coatings produced on Mg alloys.

Publications:

- **G. Rapheal**, S. Kumar, N. Scharnagl, C. Blawert, Wear behavior of plasma electrolytic oxidation (PEO) and hybrid coatings of PEO and laser on MRI 230D magnesium alloy, *Wear*, 271, 2011, pages 1987–1997.
- **G. Rapheal**, S. Kumar, C. Blawert, Narendra B. Dahotre, Effect of current density on the microstructure and corrosion properties of plasma electrolytic oxidation (PEO) coatings on AM50 Mg alloy produced in an electrolyte containing clay additives, *Surface and coatings technology*, 289, 2016, pages 150–164.
- **G. Rapheal**, S. Kumar, C. Blawert, Narendra B. Dahotre, Laser surface alloying of a creep resistant magnesium alloy MRI 230D with Al and Al₂O₃, *Magnesium Technology Symposium 2010*, Seattle, WA, Pages 161-166.
- **G. Rapheal**, S. Kumar, C. Blawert, Narendra B. Dahotre, Improving corrosion resistance of MRI 230D Mg alloy by hybrid coating of laser surface alloying and plasma electrolytic oxidation, *Materials science forum*, 706–709, 2012, pages 1209–1214.
- **G. Rapheal**, Corrosion And Wear Behaviour of Plasma Electrolytic Oxidation And Laser Surface Alloy Coatings Produced on Mg Alloys, *MatEng*, etd, IISc, 311, 2017.
- **G. Rapheal**, S. Kumar, C. Blawert, Narendra B. Dahotre, Wear-resistant thin films of MRI-230D-Mg alloy using plasma-driven electrolytic oxidation, *Condensed Matter, Materials Science, Cond-mat*, arXiv:1705.00116.

Education:

Specialization	University/Institute	Grade	Year
Ph. D. Materials Engineering	Indian Institute of Science (IISc.), Bangalore, 560012, India.	6.5/8.0	2016
M. Tech. Materials Science	National Institute of Technology (NIT) Trichy, India.	8.17/10	2004
B. Tech. Mechanical Engg.	University of Calicut/ Govt. Engg. College Thrissur, Kerala.	74.1%	1999

Industrial experience:

Organization	Role & responsibilities
Asst. Manager (Product Design) Mahle Filter systems India Ltd., Gurugram 122001, (Jan 2005– Aug 2006)	<ul style="list-style-type: none"> • Development and design of air, fuel and oil filters for automobile OEM. • 3D modeling, assembly, detailing with GD&T. • Design of gauges for QC • Value Engg., DFMEA, Tolerance stack-up analysis.
Post Graduate Engineer Bharath Technologies Auto Components Ltd., Hosur (June 2004–Dec 2004)	<ul style="list-style-type: none"> • Design and development of welding fixtures • QC gauges for two-wheeler chassis.
Engineer, Product Design Instrumentation Limited Palakkad, Kerala. (www.ilpgt.com) (Jan 2001–Aug 2002)	<ul style="list-style-type: none"> • Design of bellow sealed valves as per ASME Sec. III NB for high pressure heavy water circuits of nuclear power plants of Nuclear Power Corporation (Bellow sealed valves up to ND100 and class rating of ANSI 2500). • Familiar with ASME, ASTM, AISI, JIS, IS standards.
Project trainee Sundaram Clayton Limited, Chennai (Jan 2004–June 2004)	<ul style="list-style-type: none"> • Design and development of spring brake actuator for light commercial automobiles.
Graduate Engineer Trainee Indian Space Research Organisation, Trivandrum (Jan 2000– Jan 2001)	<ul style="list-style-type: none"> • Trained in design, fabrication, integration and testing of sub-assemblies and pre-assemblies of aerospace components for satellite launch Vehicles. • Participated in assembly of equipment bay for GSLV D1. • Participated in equipment bay mock-up for electro-mechanical harnessing and routing of flight hardware. • Assisted in fabrication of high pressure N₂ supply rig for Actuator in Loop Simulation tests for GSLV. • Calibrated pressure gages, torque wrenches, inclinometers etc.

Academic experience:

Organization	Role & responsibilities
Faculty, Ad-hoc National Institute of Technology, Calicut, Kerala Aug 2023 - Present	Conducting classes and laboratory sessions for UG programmes <ul style="list-style-type: none"> • Materials Science and Metallurgy • Machine Drawing • Principles of Management • Fluid Mechanics and Fluid Machinery • Production Engineering
Associate Professor Jyothi Engineering College, Cheruthuruthy, Thrissur, Kerala Aug 2018-Aug 2022	Conducting classes for UG and PG for the following courses: <ul style="list-style-type: none"> • Design of Machine Elements • Advanced Manufacturing Technology • Metallurgy and Materials Engineering • Industrial Automation • Virtual Instrumentation • Measurements and Sensors for Automation • Materials in Manufacturing
Associate Professor Vimal Jyothi Engineering College, Chemperi, Kannur, Kerala. (Nov 2016-Aug 2018)	<ul style="list-style-type: none"> • Design of Machine Elements • Advanced Manufacturing Technology • Metallurgy and Materials Engineering • Measurements and Sensors for Automation
Assistant Professor Kongu Engg. College, Erode. (Dec 2006 – Dec 2007)	<ul style="list-style-type: none"> • Advanced Manufacturing Technology • Design of Machine Elements • Engineering Materials and Metallurgy • Engineering Metrology and Measurements • Principles of Management • Engineering Graphics

Research Experience:

Organization	Role & Responsibilities
Helmholtz Zentrum Geesthacht (GKSS, HZG, Hereon), (DST-DAAD) Germany Jan 2009 - March 2009, Jan 2010 - March 2011	Visiting Scientist, Preparation of surface coatings on Mg alloys, Microstructural and mechanical Characterization, Corrosion and Wear testing
Indian Institute of Science, Bangalore 560012, India Dec 2015 - Feb 2016	Research Associate, Preparation of surface coatings on Mg alloys, Microstructural and mechanical Characterization, Corrosion and Wear testing

Webinars/ FDP/ Session Chair:

Role	Session details
Resource person 31 July 2021	Handled a session “Career prospects for graduates in arts and science in India” organized by Sree Vidya Mandir Arts & Science College, Krishnagiri
Resource person 12-22 July 2021	Handled a session “The structure of a research paper” in “International FDP on the Art of doing research” jointly organized by CHRIST (Deemed to be University) Bangalore, Pelita Bangsa University (UPB), Indonesia and Jyothi Engineering College, Thrissur.
Session Chair 19, 20 Feb. 2021	Chaired a session in the “The First International Conference on Innovations in Mechanical Sciences (ICIMS 21)” organized by Adi Shankara Institute of Engineering and Technology, Kalady
Resource person 20 June 2020	Conducted a webinar “Scanning “Electron Microscopy & X-ray Microanalysis” organized by IE (I) Students Chapter, Jyothi Engineering College, Thrissur.
Resource person 26 July- 8 Oct 2021	Handled a session “Career prospects for graduates in arts and science in India” in 50 day Virtual Training programme for arts and science graduate and undergraduate students organized jointly by Sree Vidya Mandir Arts & Science College, Krishnagiri and Jyothi Engineering College, Thrissur.

Awards and Recognition:

- Resident Tutor in the NIT Calicut Final Year B.Tech. students hostel since Aug 2023.
- APJ Abdul Kalam Technological University, Kerala University Examination squad member.
- APJ Abdul Kalam Technological University, Kerala M.Tech. 2022 regulation curriculum committee member.
- Appreciation from APJ Abdul Kalam Technological University, Kerala for the curriculum development and syllabus preparation for B.Tech. Mechatronics, 2019 Regulation.
- KTU Ph.D. Guideship status.
- DST-DAAD Visting scientist to Helmholtz Zentrum Geesthacht (HZG), Germany during 2009-2010.
- Gate 2002, Mechanical Engineering.

References:

1. **Dr. Ing. Carsten Blawert**,
Head of Department,
Department of Functional Surfaces.
Helmholtz Zentrum, Hereon,
Geesthacht, Germany.
Email: carsten.blawert@hereon.de
- 2 **Dr. Allen Anilkumar**,
Asst. Professor,
Department of Mechanical Engineering,
NIT Calicut.
Email: allenanilkumar@nitc.ac.in

Declaration:

I hereby declare that data furnished above are true to the best of my knowledge and belief.

Yours faithfully

Thrissur
10 August 2024

Dr. George Rapheal