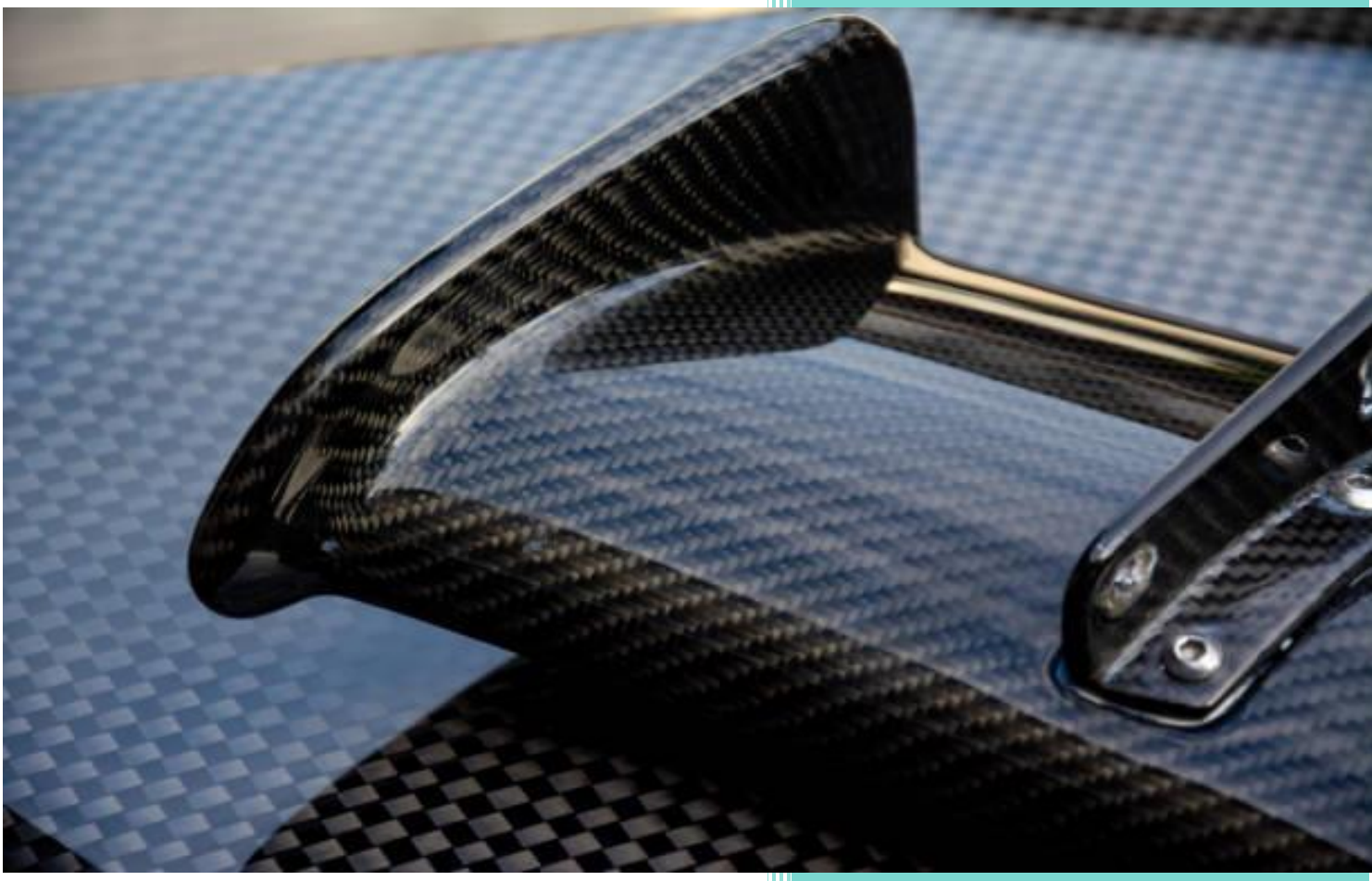
Centre for Composites Materials

CCM
CENTER FOR COMPOSITE MATERIALS



Department of Mechanical Engineering

KARE

Centre For Composite Materials

About CCM:

Centre for Composite Materials was established in 2009 and has funding worth more than 5 crores (Ongoing Projects: 3.32 crores; Completed Projects: 2.2 crores) from various funding agencies like DST, BRNS, DRDO, AICTE, MoEF etc. This centre focus research on Composite Material like nano composites, biocomposites, fiber metal laminates, Crystallography, Solid State Ionics and Polymers, thin films and material for energy and biological applications. CCM also focused on the development, study, and application of composite materials. These Composite materials are made by combining two or more distinct materials to create a new material with improved properties compared to its individual components. These materials are widely used in various industries, including aerospace, automotive, construction, sports equipment, and more. Centers for Composite Materials typically engage in research, development, and testing of composite materials, with the goal of advancing their properties, performance, and applications

This center is equipped with various advanced equipment such as a Compression Molding Machine, Computerized Universal testing Machine, Stereo Zoom Trinocular Microscope, Pin-on-disc wear tester, Flammability Tester, Digital Impact tester, Digital weighing Machine, Hot air oven, Fatigue tester, Creep tester, Corrosion analyzer, Injection Moulding Machine, and seven number of faculty are attached with this . Around fifteen research scholars are working in this center. Currently two funded projects are ongoing and more than 220 research findings have been published in the peer-reviewed journals.

VISION

Be the reference in south India on composite materials research and the first choice for students seeking quality research and international exposure.

MISSION

Achieve excellence and high scientific production through collaborative works as well as commercial and scientific partnership involving tailor made materials design, manufacturing and testing.

Objectives of the Centre

The objectives of the centre is as follows

- **Producing Natural fiber reinforced polymer composites by employing methods like hand lay-up, compression moulding, etc.**
- **Producing naturally woven fiber based composites**
- **Investigating the Mechanical properties, weathering behaviour, surface modification of composites**
- **Machining studies of Metal-Matrix Composites (MMCs), Functionally Graded Metal Matrix Composites (FGMMCs)**
- **Studies on electroless composite deposition process**
- **Developing Biodegraded bio-composite materials for eco-friendly applications.**

Collaborations

The Centre has a collaboration with leading researchers in National and International levels.

International Level:

1. **Prof. Dr. Sandro C Amico, UFRGS, Brazil**
2. **Dr. Jacob, Ghent University, Belgium**
3. **Prof. Dr. XZ. Gao, Aalto University, Finland**
4. **Prof. Dr. Sandra Maria da Luz, UnB, Brazil**
5. **Prof. Dr. Viviane Muneez, UFRN, Brazil**
6. **Dr. Nadir ayrilimis, Istanbul University, Turkey**
7. **Dr. Suchart Siengchin, KMTU, Thailand**

National Level:

1. **Dr. A. Varadarajulu, Osmania University, Visak, AP**
2. **Dr. Suresh Bimappa, National Institute of Engineers, Mysore, KA**
3. **Dr. S. Aravindan, IITD, New Delhi, DL**

4. **Dr. Sabu Thomas, MG University, Kottayam, KL**

Some key aspects often associated with these center:

1. **Research and Development:** These center conduct cutting-edge research to develop new composite materials, manufacturing processes, and technologies. They work on enhancing the strength, durability, and other properties of composites for specific applications.
2. **Interdisciplinary Approach:** Composite materials research often involves a multidisciplinary approach, combining expertise in materials science, engineering, chemistry, and other fields. Researchers collaborate to design and optimize composite materials.
3. **Testing and Characterization**: Centers for Composite Materials typically have advanced testing facilities to assess the mechanical, thermal, and chemical properties of composites. This ensures that materials meet industry standards and safety requirements.
4. **Application Focus:** CCM is closely tied to industries where composite materials are used extensively, such as aerospace, where lightweight and strong materials are essential, or automotive, where composites can improve fuel efficiency and safety.
5. **Training and Education:** CCM also offer training programs, workshops, and courses to educate students, professionals, and industry stakeholders about composite materials and their applications.
6. **Collaboration:** Collaboration with industry partners, government agencies, and other research institutions is common to bridge the gap between research and practical applications.
7. **Innovation:** These centers aim to foster innovation in the field of composite materials by pushing the boundaries of what is possible and exploring new applications and markets.

Facilities available @ CCM:

- Compression Moulding Machine
- Computerized Universal testing Machine
- Stereo Zoom Trinocular Microscope
- Pin-on-disc wear tester
- Flammability Tester
- Digital Impact tester
- Fatigue tester
- Creep tester
- Corrosion analyzer
- Injection Moulding Machine
- Stir casting machine with melting furnace
- Centrifugal casting

Products Developed

- Human safety helmet
- Pump Impellors
- Sprocket for Transmission System
- Radiator Wings
- Gears
- Composite Panels

Patent Applied

- Hard hat for civil engineering application
- Pump impellor from natural materials

RESEARCH FACILITIES @ CCM (Total Cost : 43,69,832.00 Rs)

Creep Indentation Tester

Stereo Zoom Trinocular Microscope

Scanning Electron Microscope

Compression Molding Machine

Lab Inside View

Thermal Analysis System ((DMA7100 (220-240V)

Mechanical Stirrer

Injection Moulding Machine

Hot Compression Moulding

Vacuum Bag Process

Bio Composites Laboratory

Total Cost : Rs. 24,05,395 /-

Facilities at Bio-composites Laboratory:

- Magnetic Stirrer 2ML H Unibloc Top Loading Balance
- Ultrasonicator
- Cooling Centrifuge
- Double distillation unit
- Mechanical Stirrer
- Dynamic Mechanical Analyzer
- Thermal Analysis System (DMA7100 (220-240V)

List pf Equipment & Cost Details of CCM:

Sl.	Equipment's	Cost in INR
1	Electronic Balance-Aux220	65,000
2	Compression molding machine	4,59,000
3	Universal Testing Machine	3,37,625
4	Izod-Charpy impact tester	34,200
5	Notch cutter	73,800
6	Pin on Disc Wear Tester	4,05,437

7	Hot Air Oven	40,622
8	Mechanical Stirrer	9,950
9	Magnetic stirrer	4,620
10	Flammability Tester	1,25,720
11	Rotary Bending Fatigue Tester	4,24,080
12	Optical Microscope	3,25,668
13	Corrosion Analyzer	10,947
14	Rubber Hardness Tester	15,225
15	Creep Indentation Tester	13,22,400
16	Single Stage Air Compressor	16,160
17	Density Kit-Ms204S	2,12,970

Innovative Product Developed from this Centre

Cell Phone Stand


Epoxy coated impeller


Coconut sheath helmet


Composite plywood


Lamp Holder


Kenaf clutch plate


Radiator Wings


MMC Sprocket

List of Faculty Members working Research @ CCM

S.No	Name of the Group	Group Head	Group Members
1	Advanced Materials and Manufacturing	Dr.J.T.Winowlin Jappes Senior Professor	Dr.N.Rajini / Professor Dr.A.Alavudeen/ Professor Dr.V.Arumugaprabu/ Professor Dr.M.Adamkhan/ Professor Dr.T.Senthilmuthukumar/Asso.Professor Dr.K.Mayandi`/Asso.Professor Dr.S.Vignesh/Asso.Professor

Completed Funded Projects:

SL	Title of the Project	Principal Investigator(s)	Funding Agency	Fund In INR	Approval letter Number	Project period	Status
1.	FIST, (Materials Processing Laboratory)	Dept. of Mechanical Engg.	DST	1,25,00,000 (54,00,000)	SR/FST/ETI-052/2010	5 years	completed
2.	Investigation of hybrid polymer composites using chemically treated curaua and basalt fibers for medium-load applications	Dr. I. Siva Dr. JT. Winowlin Jappes	DST/CNPq Indo-Brazil Joint Project.	35,00,000	INT/Brazil/P-11/2013	3 Years	completed
3.	Investigation of hybrid polymer composites using chemically treated curaua and basalt fibers for medium-load applications	Dr. I. Siva	CNPq/Brazil	26.389 BRL (16,00,000 INR)	BJT No. do Processo: 401.741/2013-3	1 year	completed
4.	Investigation on mechanical properties of naturally woven coir/non-clay	Dr. JT. Winowlin Jappes	DST	14,70,000	SR/FTP/ETA-092/2009	3 years	Completed

	reinforced hybrid composites						
5.	Investigation on the mechanical properties of naturally woven Luffa reinforced Polymer composite	Dr. I. Siva	TNSCST	6,000	TNSCST/SPS/ARL2009-10	6 months	Completed
6.	Investigation of Mechanical Properties of Basalt Fiber Reinforced Polymer Composites	Dr. V. Manikandan Dr. JT. Winowlin Jappes	DST	20,32,000	SR/SE/ME/0038/2007	3 years	Completed

Ongoing Funded Projects:

S. No.	Project Title	Principal Investigator	Sanctioned Date	Funding Agency	Total Amount in INR	Years
1.	Empowerment of the Scheduled Caste Farmers via 'Polymer Composite Mulch' Technology for Enhanced Yield and Quality of Vegetable Crops	Dr.J. T. Winowlin Jappes Dr. P. Pandiyaraj Dr. M.Ramaganesh	2023 Recently Sanctioned	DST-SEED	74,70,000	3 Years
2.	Establishment of STI hub for production of ecofriendly and economical products to improve the socio-economic status of SC population in Srivilliputhur block, Virudhunagar District, Tamil Nadu State	Dr. R. Kanniga Devi/Computer Science Dr. N. Rajini/Mech Dr. M. Muthukannan/CivilDr. C. Ramesh Babu/Civil Dr. V. Kannan/Agri	03-03-2020	DST-SEED	2,38,43,900	3 Years
3.	IN SITU development and investigations on the shape	Dr.J.T.Winowlin jappes	14 .08.2020	AICTE	20,62,745	3 Years

	memory assisted bio-degradable electronic devices substrate using 3-D printing					

Activities from collaboration in Last 12 months at CCM centre

- **Visited one Brazilian Collaborator from UFRN, Brazil to CCM centre**
  - **Dra. Viviane Munees, Professor/Department of Textile, UFRN, RN/Brazil.**
  - **Dates, Arrival: 01/11/2022, Period of stay: 10 Days**
- **A one day National Level workshop on "Advanced Composites materials" conducted on 07/11/2022 towards utilizing the expertise of Profª. Viviane'**
- **Conducted One Seminar on " 3D printing Composites materials" on 08-02-2023 through Online taken by Dr.Nadir Ayrilimis from Istanbul university, Turkey.**
- **Conducted An International Indo- Brazil Bilateral Conference on "Advanced Materials and Processing " amp2023 was successfully organized on 24-25, March 2023 with >200 participations from various parts of globe.**
- **Conducted another one International Conference on " Advanced materials and smart satellite for rural applications.**
- **Two number of Brazilian Professors were invited for "Invited Talk" from various zones of Brazil, for conference they are**
  - **Prof. Dr. Jeferson Avila Souza, Universidade Federal do Rio Grande, Brazil**
  - **Prof. Dr. Sandra Maria da Luz, Universidade de Brasília, Brazil**

List of Book Publication through CCM centre

Sl.NO	Title of the book	Authors	ISBN	Publisher	Publishing Year

1.	**Sandwich Composites Fabrication and Characterization**	**Senthil Muthu Kumar Thiagamani, Senthilkumar Krishnasamy, Chandrasekar Muthukumar, Suchart Siengchin**	**978-0367-697273**	**Taylors & Francis**	**2022**

List of Book Chapters Publication through CCM centre

Sl. No	Books Chapter Title	ISBN/Publisher	Published Year
1.	**Abrasive water jet cutting and its optimization model for machining the sheep wool/polyester composites**	**978-0-12-824056-4**	**2022**
2.	**Banana Fiber: A Sustainable Raw Material For Product Development From The Biowaste Of Musa Acuminata Wild Species Varieties**	**978-81-956844-1-0**	**2022**
3.	**Pineapple fibers, their composites and applications**	**978-0-12-824528-6**	**2022**
4.	**Bamboo fibers, their composites and applications**	**978-0-12-824528-6**	**2022**
5.	**Performance of Graphene: A Brief Literature Review on Technologies for Composite Manufacturing**	**978-981-16-8697-9**	**2022**
6.	**Machining Studies of Basalt Fiber Reinforced Aluminium Metal Matrix Composites Using Abrasive Jet Machining**	**978-981-50-3990-0**	**2022**
7.	**Machining Studies of Basalt Fiber Reinforced Aluminium Metal Matrix Composites Using Abrasive Jet Machining**	**978-981-5039-90-0**	**2022**
8.	**Advanced Natural/Synthetic Composite Materials for Marine Applications**	**978-981-99-1582-8**	**2023**
9.	**Advanced applications of biomass nanocellulose-reinforced polymer composites**	**978-0-443-19053-7**	**2023**

10.	**Erosion Studies on Al/TiC/RHA Reinforced Hybrid Composites through Response Surface Method**	**9781003345466**	**2023**
11.	**Compression and Impact Properties of Vinyl Ester-Based Bio-Composites**	**9781032220482**	**2023**
12.	**Kenaf-Banana-Jute Fiber-Reinforced Vinyl Ester-Based Hybrid Composites: Thermomechanical, Dynamic Mechanical and Thermogravimetric Analyses**	**9781003270997**	**2023**
13.	**Tribological Properties of the Natural Fiber-Reinforced Vinyl Ester Composites**	**978-3-527-35053-7**	**2023**
14.	**Lightweight and sustainable materials for automotive applications**	**9780367876654**	**2023**
15.	**Recyclability of lightweight and sustainable materials**	**978-0-323-95189-0**	**2023**

Technology Developed

- **Two recent composite manufacturing technologies were transferred from UFRGS, Brazil to India as an outcome of exchange visit**
  - **Resin Transfer Molding**
  - **Vacuum Infusion**

List of Ph.Ds Completed From This Centre in Last 12 months.

Sl. NO	Name of the Scholar	Supervisor Name	Title Of Work	Year of Award
1	**Mr. P.Sivasubramanian (Reg No: 2019142115)**	**Dr. K.Mayandi**	**Extraction, Characterization And Functional Properties Of Newly Identified Acacia Caesia Bark Fiber Reinforced Epoxy Polymer Composites**	**2023**
2	**Mr. Sangilimuthukumar (Reg no: 9202010001**	**Dr.T.Senthil MuthuKumar**	**Influence of Different Weaving Patterns on The Performance of Kevlar/Palf/Hemp Fiber Reinforced Hybrid Composites**	**2023**

3	Mr. Ayyanar Raja (Reg No: 201414252)	Dr. S. Suresh Kumar,	Mechanical, Wear And Machining Studies Of Nano Basalt Powder And Silicon Carbide Reinforced Aluminium Based Hybrid Composites	2023
4	Mr. J. Manivannan (Reg No: 201514265)	Dr. S. Rajesh	Mechanical And Machinability Behaviour Of Sheep Wool Fibre Reinforced Polyester Composites	2023
5	Purusothaman M (Reg No. 201514264)	Dr. S. Rajesh	Mechanical and Machinability Characteristics of Al-NiTi/SiC Hybrid Composite Materials	2022
6	Premkumar T (Reg. No. 201314246)	Dr. I. Siva	An Integral Approach To Develop Curauá and Its Hybrid Fiber Composites for Automotive Applications	2022
7	A. Ajithram (Reg. No. 2019141112)	Dr. J.T. Winowlin Jappess	Investigation on Water Hyacinth (Eichhornia Crassipes) Natural Plant Based Polymer Composite Material Properties	2022
8	Mr. Avinash sudam Shinde (Reg No:- 201814295)	Dr. I. Siva	Development of Nano-Composites for Electromagnetic Interference (EMI) Shielding Application	2022
9	Mr. S. Vignesh (Reg No:- 201814296)	Dr. J.T. Winowlin Jappess	Development and Characterization of Solution Casted Layered Polymer Composites (SCLPC) for Radiation Shielding Applications	2022

ADVANCED MATERIALS & MANUFACTURING RESEARCH GROUP @ CCM

Materials research group is one of the pioneer research group established in the year 2007 comprised with cluster of material science in the department of mechanical engineering. Initially, It was established from the approval of DST-Funded Project in the year 2007 for the worth of Rs 23 lakhs. The wings of the centre extended further by including the experts working in the field of Surface Engineering, Coating Technology and Bio-Composite sectors. Currently, eight of our faculty involved in this centre to disseminate the advancement of research towards global market. Around 20 international collaborators joined the hands together with us in the past five years. The details of area of expertise for the individual members are stated below.

Group Head

Dr. J.T. Winowlin Jappes
E-mail: winowlin@klu.ac.in

Members

Dr. N. Rajini

Dr.V. Arumugaprabu

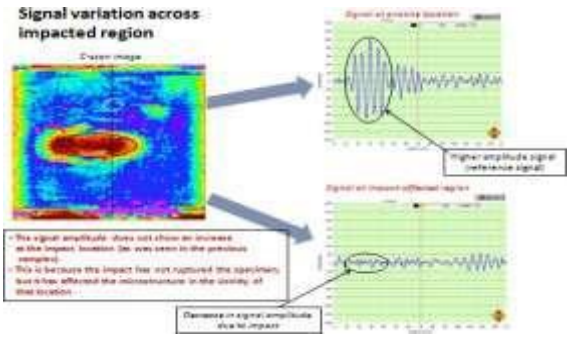
Dr. Adam Khan M

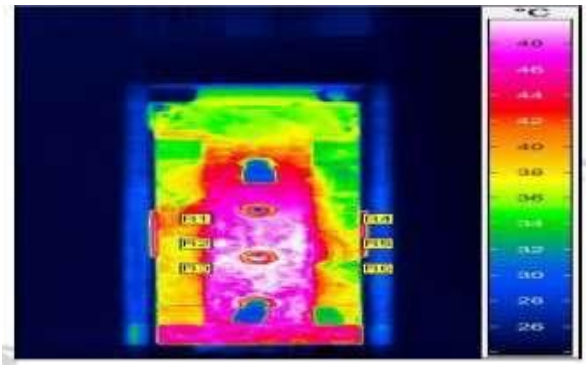
Dr. K. Mayandi

Dr. S. Vignesh

Research Focus:

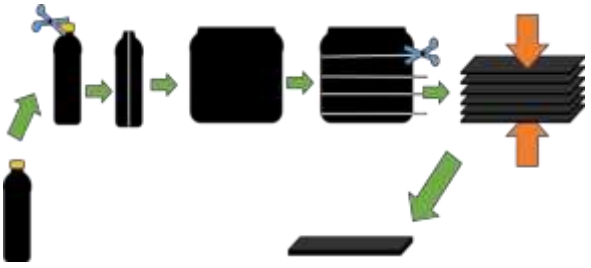
The research group members are working on natural fiber-based composites and its hybrids including biochar-based polymer composites and graphene-based biopolymer composites Studies on Low-velocity impact on basalt fibercomposites are under progress. The figure shows theC Scan image of low velocity tested sample of four layered basalt polyester composites. A new area of research is initiated in collaboration with MGU, Kottayam on nano cellulose composites.





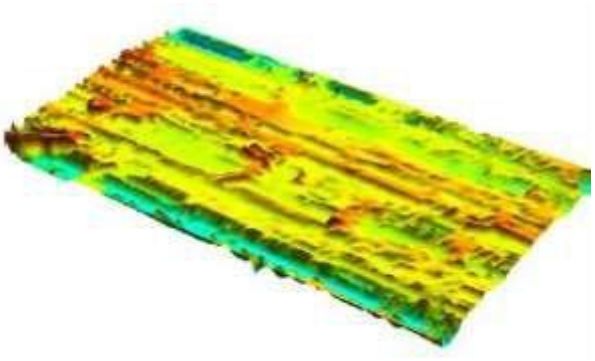
Our members are also actively involved in the fabrication of biodegradable materials and tribology studies on polymer composite materials. Recently this group fabricated cellulose based bio degradable polymer thin film for packaging applications. Other areas of research include flow feeding mechanism of casting products for improving strength and materials quality, and mechanical properties nano fibre based bio composites and natural fibre based polymer composites materials.

Another area of research by this group is the development of lightweight structures for aviation. Other research areas include self-healing polymeric materials and metal- polymer hybrids and their fatigue behaviors. The members are also developing floor and roof tiles from land-thrown PET bottles.



Another area of research is tribology, corrosion and surface engineering including research on Corrosion and Surface Engineering for Gas Turbine engine components. The study on engine components failure due to halides and other contaminants at elevated temperature are studied. The grain defects and phase changes studies are the main focus of this research.

Another research area is on the characterization of natural fibres and the use of natural fibres as reinforcement with polymer composites materials for biodegradable applications. This group also focuses on fracture analysis of layered polymer composites materials and are also involved on the fabrication and testing of filament winding polymer composites tube for medium load applications areas.



Research Report Publications in Last 12 Months:

S. No	Names of the authors	Title, Year. Vol, Pages	International/Journal name	Impact Factor, if any	Year
1.	A Shinde, **I Siva**, Y Munde, I Sankar, MTH Sultan, FS Shahar, M Gaff, D Hui	"Appraising the dielectric properties and the effectiveness of electromagnetic shielding of graphene reinforced silicone rubber nanocomposite." 12 (1) (2023): 20220558	Nanotechnology Reviews	6.7	2023
2.	A Nair, W Bizoń, S Skoczypiec, **M Uthayakumar**	"Experimental investigations on electro erosion milling of Al-SiC metal-matrix composite." (2023): 1-14	Materials and Manufacturing Processes	4.8	2023
3.	G Elizabeth Rani, R Murugeswari, Selvakumar Vairamuthu, **N Rajini**, Faruq Mohammad, Suchart Siengchin, Sikiru O Ismail, K Senthilkumar	"An automated software development for analysis of the morphological tensile property relationship in egg shell bio-based particulate composites using machine learning algorithms." 10 (2023): 100343	Composites Part C: Open Access	4.76	2023
4.	R Pradeep, **V Arumugaprabu**, P Geetha, R Sundarakannan, S Vigneshwaran, K Naresh, V Deepak, M Uthayakumar	"The development and multifunctional characterization of cashew (Anacardium occidentale) nut shell biochar reinforced vinyl ester composites for sustainable management." Biomass Conversion and Biorefinery, 1-14	Biomass Conversion and Biorefinery	4.05	2023
5.	J Dhesinghraja, **K Mayandi**, N Rajini, C Prakash	"A potential renewable energy resource from the biomass of banana pseudostem (Musa acuminata) wild species variety." (2023): 1-12	Biomass Conversion and Biorefinery	4.05	2023
6.	**S Vignesh, JTW Jappes**, S Nagaveena, RK Sharma, MA Khan, CV More	"Preparation of novel in-situ layered B4C and PbO reinforced solution casted layered polymer composites (SCLPC) for augmenting the gamma irradiation shielding capability." 207 (2023): 111583	Vacuum	4	2023
7.	S Palanisamy, **M Kalimuthu**, C Santulli, M Palaniappan, R Nagarajan, Cristiano Fragassa	"Tailoring Epoxy Composites with Acacia caesia Bark Fibers: Evaluating the Effects of Fiber Amount and Length on Material Characteristics." 11(7) (2023): 63	Fibers	3.9	2023
8.	Sivasubramanian Palanisamy, **Mayandi Kalimuthu**, Rajini Nagarajan, José Maria Fernandes Marlet, Carlo Santulli	"Physical, Chemical, and Mechanical Characterization of Natural Bark Fibers (NBFs) Reinforced Polymer Composites: A Bibliographic Review." 11 (2) (2023): 13	Fibers	3.9	2023
9.	R Sundarakannan, K Balamurugan, Y Jyothi, **V Arumugaprabu**, Thanikodi Sathish, Z Mahmoud, El Sayed Yousef, Dadapeer Basheer, Saboor Shaik	"Importance of Fiber-/Nanofiller-Based Polymer Composites in Mechanical and Erosion Performance: A Review." (2023)	Journal of Nanomaterials	3.791	2023

10.	Aravind Dhandapani, Senthilkumar Krishnasamy, **Rajini Nagarajan**, Anto Dilip Albert Selvaraj, **Senthil Muthu Kumar Thiagamani**, Chandrasekar Muthukumar, Faruq Mohammad, Hamad A Al-Lohedan, Sikiru Oluwarotimi Ismail	"Investigation of wear behavior in self-lubricating ABS polymer compositesreinforced with glass fiber/ABS and glass fiber/carbon fiber/ABS hybrid." 11 (3) (2023): 131	Lubricants	3.584	2023
11.	**Gananiar Kalusuraman**, Sundaresan Thirumalai Kumaran, Karnan Balamurugan, Nenmeni Sivashanmugam, Palani Sivaprakasam, Rendi Kurniawan, Veeranan Ezhilmaran	"Vibration studies on fiber reinforced composites–a review." 20 (1) (2023): 2157361	Journal of Natural Fibers	3.507	2023
12.	A Udhayakumar, **K Mayandi, N Rajini**, RK Devi, M Muthukannan, M Murali	"Extraction and Characterization of Novel Natural Fiber from Cryptostegia Grandiflora as a Potential Reinforcement in Biocomposites" 20 (1) (2023): 2159607	Journal of Natural Fibers	3.5	2023
13.	MCP Selvan, I Sankar, **I Siva**, Y Dong	"Synergistic effect of fiber surface treatment and nanoclays on the damping behaviors of polyester composites reinforced with palmyra fruit fibers." (2023): 1-15	Polymer Bulletin	3.2	2023
14.	D Aravind, K Senthilkumar, **N Rajini**, Suchart Siengchin, Krittirash Yorseng, T Senthil Muthu Kumar, M Chandrasekar, Faruq Mohammad, Hamad A Al-Lohedan	"Flexural, impact, and dynamic mechanical analysis of glass fiber/ABS and glass fiber/carbon fiber/ABS composites." (2023): e54007	Journal of Applied Polymer Science	3.057	2023
15.	D Aravind, Senthilkumar Krishnasamy, **N Rajini**, Suchart Siengchin, T Senthil Muthu Kumar, M Chandrasekar, Krittirash Yorseng	"Thermal and tensile properties of 3D printed ABS-glass fibre, ABS-glass fibre-carbon fibre hybrid composites made by nove(2023)l hybrid manufacturing technique." 08927057231170805	Journal of Thermoplastic Composite Materials	3.027	2023
16.	JR Jessy Michla, **Nagarajan Rajini,** Sikiru Oluwarotimi Ismail, T Ram Prabhu, Faruq Mohammad, Suchart Siengchin, MP Indira Devi	"Effects of nitriding on salt spray corrosion resistance of additively manufactured 17-4 PH steels." 330 (2023): 133258	Materials Letters	3	2023
17.	D Periyasamy, B Manoharan, FS Arockiasamy, D Aravind, K Senthilkumar, **N Rajini**, F Mohammad, H.A Al-Lohedan	"Exploring the recycling potential of HDPE films reinforced with flax fiber for making sustainable decorative tiles." 25 (2023) 2049-2060	Journal of Materials Research and Technology	2.9	2023
18.	A Ajithram, **JTW Jappes**, GK Chithra, R Daphne	"Serious environmental threat water hyacinth (Eichhornia crassipes) plant natural fibress: Different extraction methods and morphological properties for polymer composite..."	Materials Today: Proceedings	2.59	2023
19.	A Ajithram, **JTW Jappes**, SD Kumar, GK Chithra	"Water hyacinth plant powder particle with moringa filler powder reinforced epoxy polymer composite absorption properties." (2023)	Materials Today: Proceedings	2.59	2023
20.	A Ajithram, **JT Winowlin Jappes, N Rajini, I Siva**, KR Sumesh, D Dawood	"Serious ecological threat water hyacinth (Eichhornia crassipes) plant into successive hyacinth ash with eggshell filler reinforced polymer composite—waste into zero waste concept."	Proceedings of the Institution of Mechanical Engineers, Part E: Journal of Process Mechanical Engineering	2.4	2023
21.	I Sankar, **I Siva**	"The synergy of fiber surface treatment and nanoclay on the static mechanical and tribological behaviors of Palmyra fruit fiber/Montmorillonite nanoclay reinforced polyester hybrid composites" 237 (1) (2023)	Proceedings of the Institution of Mechanical Engineers, Part L: Journal of Materials: Design and Applications	2.4	2023

22.	A Udhayakumar, **K Mayandi, N Rajini**, RK Devi, M Muthukannan, M Murali, S. Ismail, F. Mohammad, H. A Al-Lohedan	"Effect of chemical treatment on physico-chemical properties of a novel extracted cellulosic Cryptostegia grandiflora fiber." 10 (7) (2023): 075508	Materials Research Express	2.3	2023
23.	S Palanisamy, **M Kalimuthu**, S Dharmalingam, A Alavudeen, R Nagarajan, S. Ismail, S. Siengchin, F. Mohammad, H. A Al-Lohedan	"Effects of fiber loadings and lengths on mechanical properties of Sansevieria Cylindrica fiber reinforced natural rubber biocomposites." 10(8) (2023): 085503	Materials Research Express	2.3	2023
24.	M Aslan, K Cava, H İpek, ST Kumaran, **G Kalusuraman, M Uthayakumar**, C Prakash	"Surface and Mechanical Properties of 3D-Printed Biocompatible ABSPolymers." (2023): 1-10	Journal of Materials Engineering and Performance	2.3	2023
25.	PVG John, ME Sahayaraj, **JTW Jappes**, SJ Leon	"Corrosion characteristics of microwave and furnace annealed electroless Ni- P-TiO2 coatings." (2023)	Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science	2	2023
26.	GE Rani, R Murugeswari, **N Rajini**	"Detection of material strength of composite eggshell powders with an analysis of scanning electron microscopy." 46 (2) (2023) 74	Bulletin of Materials Science	1.9	2023
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