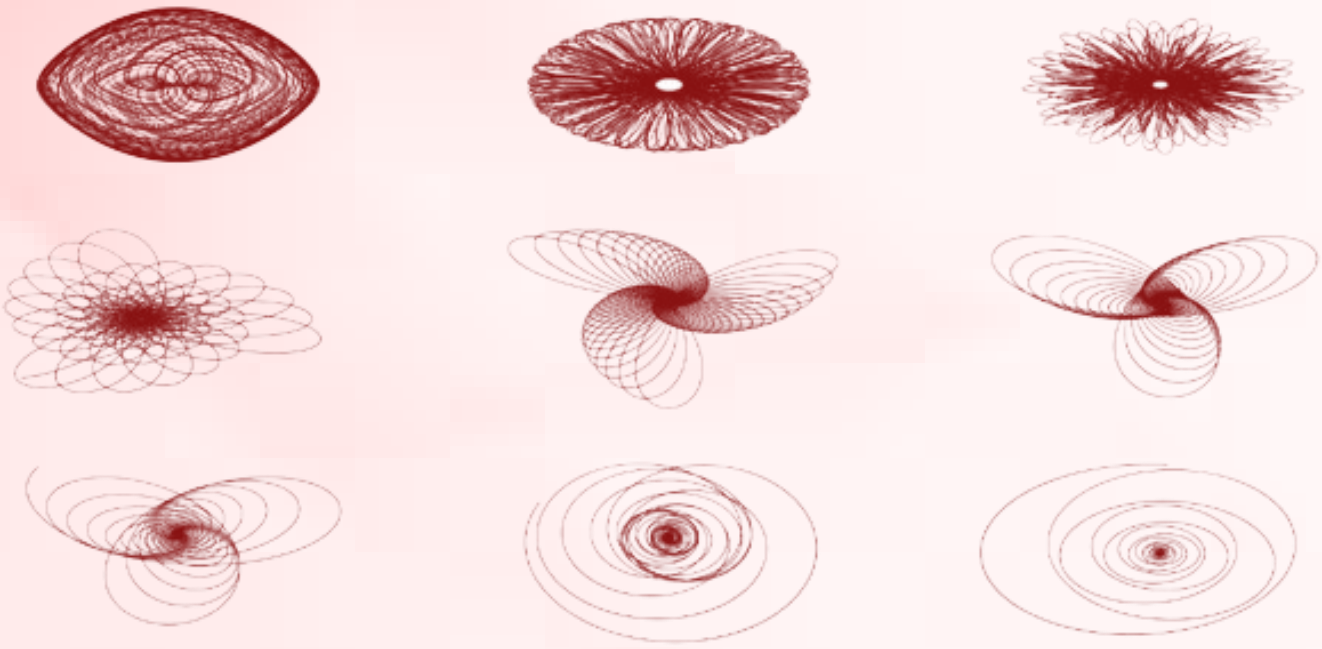
SRM
INSTITUTE OF SCIENCE & TECHNOLOGY
Deemed to be **University** *u/s 3 of UGC Act, 1956*

Horizon

Quarterly Newsletter

Volume 3, Issue 1

(January to March 2024)



School of Basic Sciences

College of Engineering and Technology
SRM Institute of Science and Technology

Kattankulathur - 603 203, Chengalpattu District

Tamil Nadu, India

NAAC	UGC	nirf	QS	THE WORLD UNIVERSITY RANKINGS	QS 4★ RATING	SHANGHAI RANKING
A++	Category I with 12B Status	(2023) Ranked 18th University	(2024) World Ranking one among 45 Indian Universities	(2023) World Ranking one among 75 Indian Universities	VERY GOOD QS 4 Star Rated Globally	(2022) World Ranking one among 14 Indian Universities

Cover page theme: A set of nonlinear equations for the evolution of Internal Gravity Waves

Pic Courtesy : SRMIST

Message from the Dean Sciences

Dr. D. John Thiruvadigal
Professor and Dean Sciences
School of Applied Sciences
College of Engineering and Technology
SRM Institute of Science and Technology
Kattankulathur 603 203

I am happy to note that we are releasing volume 3 issue 1 of the newsletter "Horizon" with highlights on the accomplishments and activities of the School of Basic Sciences during January to March 2024. My sincere thanks to the editorial team of the newsletter "Horizon", Hearty congratulations and appreciation to the faculty members, research scholars and students for their accomplishments in publishing high impact journals, publishing patents, and securing the funds. I anticipate all the members to continue working work with the same spirit that will enhance not only their individual career but also the school's growth.

I take this opportunity to welcome the newly recruited faculty of research track to the school of basic sciences. I certainly feel that the new faculty will take the onus in strengthening the research ecosystem of the departments.

Cover page theme:

The theme of this issue of "Horizon" portrays the theory of low-frequency internal gravity waves (IGWs) is readdressed in the stable stratified weakly ionized Earth's ionosphere. The formation of dipolar vortex structures and their dynamical evolution as well as the emergence of chaos in the wave–wave interactions are studied both in the presence and absence of the Pedersen conductivity. The latter is shown to inhibit the formation of solitary vortices and the onset of chaos.

(D. John Thiruvadigal)

Message from the HoD, Chemistry

Dr. M. Arthanareeswari
Professor and Head (Admin.)
Department of Chemistry
College of Engineering and Technology
SRM Institute of Science and Technology
Kattankulathur 603 203

The annual flagship event of the Department of Chemistry, ICRAMC 2024 was held during Feb 15-17, 2024. It is our great privilege that our department is organizing this flagship event for 8 continuous years. Notable eminent speakers from academia and industry actively participated in ICRAMC-2024 and shared their excitement and knowledge to conference participants.

Eight best presentations were awarded with cash prize. In addition, our scholars have participated in Research day and Dr. Paarivendhar Research Colloquium (DPRC) and won various awards. I take this opportunity to congratulate our scholars Ms. Esther Rubavathy, Mr. M. Vinoth Inbaraj and Mr. Jithin Rafi for receiving research internship to Purdue University, USA, DST-Inspire fellowship and TEEP internship, Taiwan respectively.

I extend my appreciation to our faculty members who received funded projects from various government agencies to the tune of 85 lakhs for a period of three years.

In this period, our dynamic research activities also lead to three granted and four published patents. During Jan. to Mar. 2024, 79 international publications were published with an average impact factor of 5.96, including 5 nature indexed journals.

A One-day National Workshop on “Enriching Skilled Minds: Promoting Value Based Education in Schools” was organised with an objective to motivate the school teachers to inculcate the basis of human values to their self and to the student community. The total audience was 68 teachers from 12 different government and private schools. This programme served as a good platform to contribute to society.

6 invited speakers gave their talk through our chemistry association seminar. As part of alumni connect, two alumnus from our M.Sc. Program gave mentor sessions focusing on B.Sc and M.Sc. student’s career opportunities in India and abroad.

Message from the HoD, Mathematics

Dr. V. Subburayan
Associate Professor and Head In-Charge
Department of Mathematics
College of Engineering and Technology
SRM Institute of Science and Technology
Kattankulathur 603 203

The Department of Mathematics is very happy to be a part in the release of our newsletter “Horizon – Volume III, Issue I”. The period January – March 2024 witnessed the hard-work and team spirit of all mathematics faculties and students. The Department was a part of the organizing team of Dr. Paarivendhar Research Colloquium DPRC-2024 under the guidance of the Directorate of Research. The event was a grand success mainly due to the never ending enthusiasm and perseverance of all our faculties and students.

It is indeed a proud moment to share that our Mathematics women faculties and students actively participated in the International Women’s Day 2024 Celebrations and won the runner-up position. The department congratulates all the contributors for their hard work and commitment. Kudos to all the students who got recruited. I express my sincere gratitude to the members of the department for their dedication and contribution.

Message from the HoD, Physics & Nanotechnology

Dr. A. Karthigeyan
Professor and Head In-Charge
Department of Physics
and Nanotechnology
College of Engineering and Technology
SRM Institute of Science and Technology

Welcome to volume 3 issue 1 of Horizon newsletter presenting our activities and accomplishments during January to March 2024. At this juncture, it is my duty to greet the newly joined faculty members Dr. Arnab Ganguly and Dr. Banasree Sadhukhan for adding strength of expertise to the department. I recall that it was very eventful and beneficial having many Physics stalwarts during National Physicist's Conclave 2024. I hope we have utilized the opportunity to discuss and focus future directions in Physics. It is worth to note and congratulate Dr. K. Mani Rahulan, Dr. Madhuparna Karmakar, Dr. Saurabh Ghosh, Dr. R. Ajay Rakkesh, Dr. S. Harish, Dr. P. Malar for garnering externally funded projects. Appreciations are due for our faculty members who have published 6 Nature indexed journal publications. My special appreciations are due to Dr. Rohit Dhir and Dr. G. Devanand for their efficient mentorship yielding higher education opportunities and publications for a number of students.

In the end, I would like to stress that let us put forth our best efforts to develop Industry-Academia partnerships and development of e-learning resources in the coming days along with our regular activities. My heartfelt congratulations to our faculty members and students who have garnered special recognitions for their work, and I wish them the best.

Editorial Team

Contents

From the Editors Desk

Dear Readers,

Greetings!

We take pleasure in announcing the release of the Volume 3, Issue 1 of HORIZON, the quarterly newsletter of school of Basic Sciences that showcases the activities and achievements of our students and faculty members in the last three months (January 2024 – March 2024).

The issue spotlights the breadth and depth of the contribution of students and faculty members towards teaching, research and consultancy which makes the school of basic sciences special. The issue also highlights the numerous accomplishments by the members of the school in research article publication, acquiring grants and fellowship, patenting and alumni activities.

We invite all the readers' inputs for the betterment of the newsletter. Please write to us at dean.sciences.ktr@srmist.edu.in

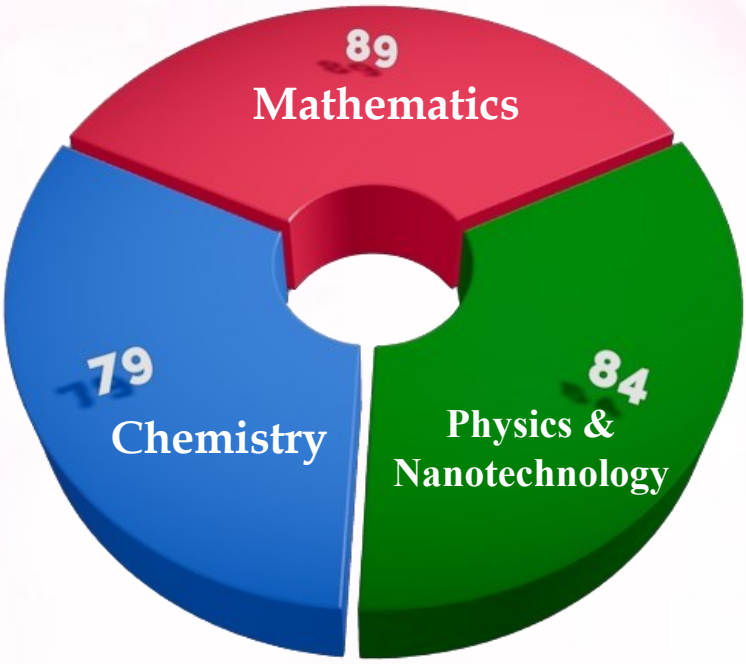
Please enjoy reading our newsletter !!

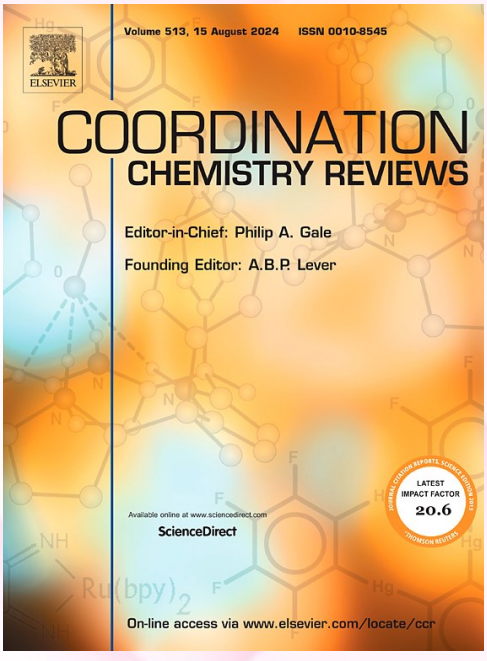
Highlights

School of Basic Sciences

Key Metrics	October to December 2023	January to March 2024
Total No. of publications (SCI/Scopus)	242	252
Highest Impact Factor Journal Publication	30.0	20.6
No of projects sanctioned	6	12
Total grant outlay	168.58 Lakhs	223.93
No of patents filed / granted	3	12
No of book chapters	6	4
MoUs (International / National)	-	1
Number of Ph.D's completed	16	15

Total number of research publications:
(January to March 2024)





(Impact factor : 20.6)

Academics

SRM Institute of Science and Technology has always been a creator in promoting research an innovation in par with the current trends. With this motto, the institution regularly organizes the Dr. Paarivendhar research colloquium (DPRC) to provide a platform for researchers from all disciplines to exchange their ideas and to learn new concepts and techniques to help with their research.

The fifth edition of Dr. Paarivendhar research colloquium (DPRC) 2024 was jointly organized by the Directorate of Research and the Department of Mathematics, from 26th to 28th March 2024. The event was inaugurated by Prof. Santanu Bhattacharya, Director, Indian Institute of Science Education and Research (IISER), Tirupati.

Academics - Chemistry

QS world ranking 351-400 by subject.

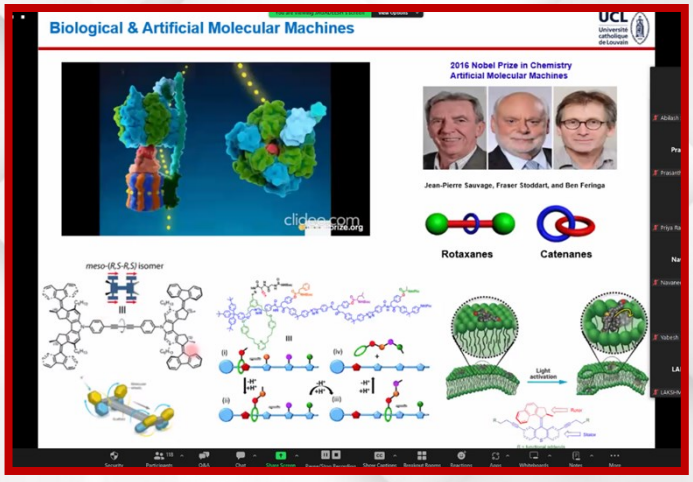
8th position (joint) among Indian universities.

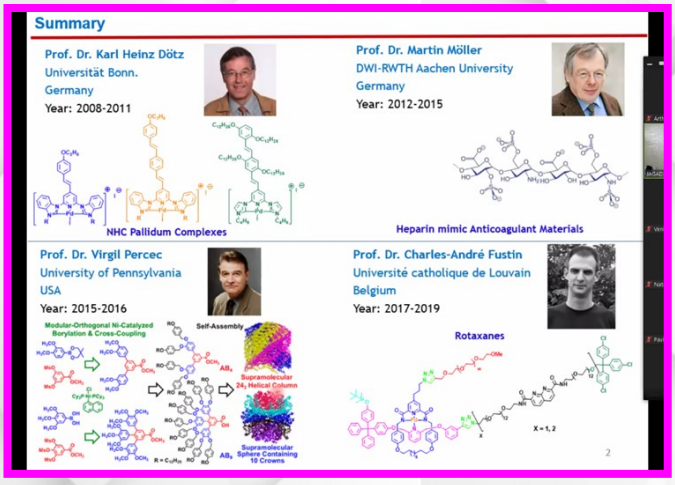
1st position (joint) under the private institutes.

The Department of Chemistry, SRM IST organized the 8th International Conference on Recent Advances in Material Chemistry (ICRAMC-2024) between 15-17, February 2024 at SRM Institute of Science and Technology, Chennai, Tamil Nadu.

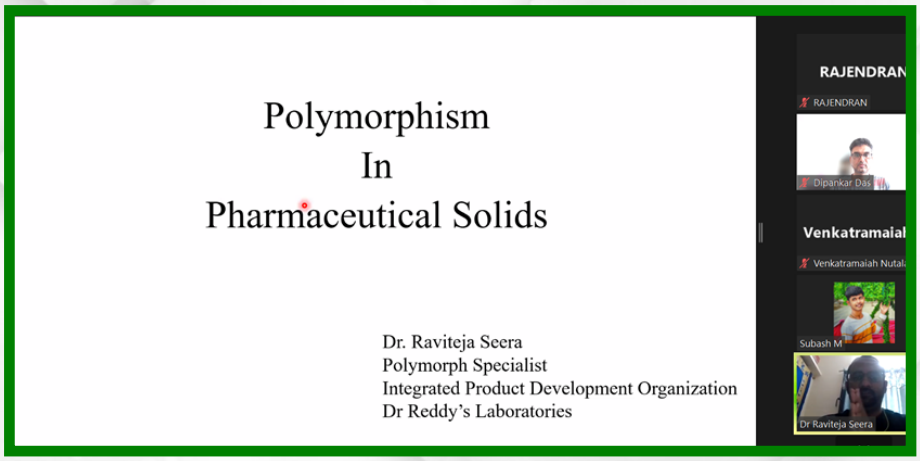
The conference featured plenary lecture, invited and contributed talks as well as poster presentations organized in different sessions. The invited speakers were globally recognized experts in the respective fields' viz **Dr. Cecilia Menard-Moyon, Institut de Biologie Moléculaire et Cellulaire Strasbourg Cedex, France, Dr. Gregory Pieters, Alternative Energies and Atomic Energy Commission (CEA), France, Prof. Chang Woo LEE, Kyung Hee University, South Korea, Dr. Hyunwoong Park, Kyungpook National University, South Korea, Prof. Wan Pyo Hong, Gachon University, South Korea, Dr. Jiaqian QIN, Chulalongkorn University, Thailand, Prof. Huynh Han Vinh, National University of Singapore, Singapore, Prof. Sangaraju Shanmugam, Daegu Gyeongbuk Institute of Science and Technology (DGIST), South Korea. The plenary and invited talks from the esteemed speakers included emerging topics such as nanomaterials as artificial enzymes, design strategies for sodium ion batteries, artificial photosynthesis, electrocatalytic hydrogen evolution, organic deep blue OLEDs and more.** More than 300 technical papers were presented in the conference and the presented papers will be submitted as full manuscripts for possible publication in the technical journals.

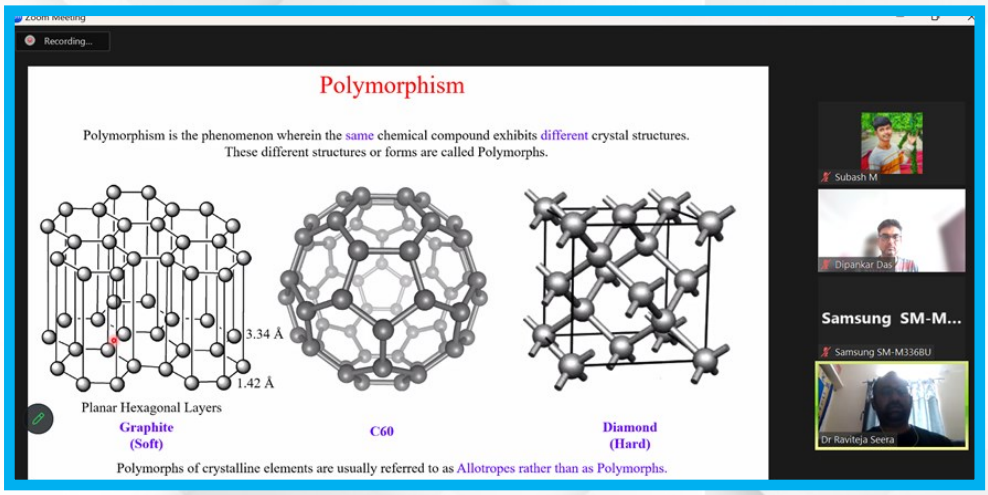
Department of Chemistry organized a lecture on "Investigating Structure-property Relationships in The Design of Functional Molecular Materials" under the "CHEMISTRY ASSOCIATION EVENT" on 28th March 2024. The speaker of the event is **Dr. Manish Kumar Mishra, Scientist, Physical/Materials Chemistry Division, National Chemical Laboratory, Pune.**



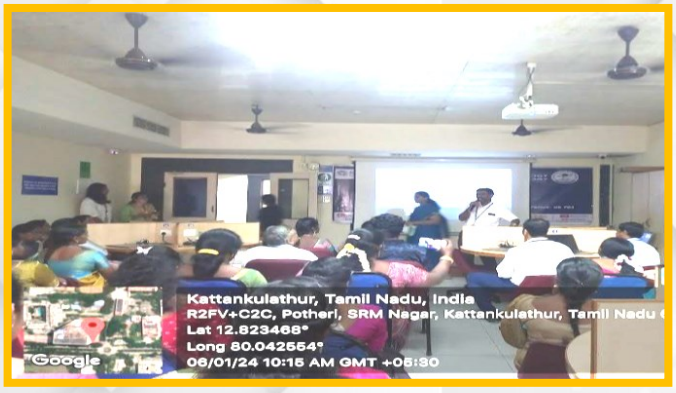


Department of Chemistry organized a lecture on "**Artificial Molecular Machines for Controlled Mobility Applications**" under the "CHEMISTRY ASSOCIATION EVENT" on 09th March 2024. The speaker of the event is **Dr. Jagadeesh Malineni, Senior Scientific Manager, Aragen Integrated Drug Discovery, Hyderabad & Professor of Practice, Department of Chemistry, SRMIST.**





Department of Chemistry organized a lecture on "Polymorphism of Pharmaceutical solids" under the "CHEMISTRY ASSOCIATION EVENT" on 24th February 2024. The speaker of the event is **Dr. S. Ravi Teja**, API R&D, IPOD unit. Dr. Reddy's Laboratory, Hyderabad, Telangana.



Department of Chemistry organized a A One-day National Workshop "**Enriching Skilled Minds: Promoting Value Based Education in Schools**" at 06th Jan, 2024. The speakers of the event are **Dr. Arul Saravanan MD, DPM,** Professor & Head, Department of Psychiatry, SRM Medical College Hospital nad Research Centre , **Dr. T. Madhusudan**, Professor, Department of Psychiatry, SRM Medical College Hospital and Research Centre and **Dr. T. Pushpa Malini**, Assistant Professor, Dept. of Chemistry, SRMIST.

Newly Joined Faculty Members

Prof. Ayyappanpillai Ajayaghosh, FASc., FNASc., FNA, FTWAS

Prof. Shanti Swarup Bhatnagar Chair Professor, School of Basic Sciences, SRMIST

Honorary Professor (AcSIR) and J. C. Bose National Fellow, CSIR-NIIST, Trivandrum

Prof. Ajayaghosh, currently S. S. Bhatnagar Chair Professor, SRM Institute of Science and Technology, Kattankulathur, Chennai, is the former Director of CSIR-NIIST and a J. C. Bose National Fellow at CSIR-NIIST, Thiruvananthapuram, India. He obtained masters and Ph. D. in chemistry from Calicut University. His research interests are in the areas of organic materials such as fluorescent materials, photoresponsive materials, organogels, molecular probes, covalent organic frameworks etc. He introduced a new class of soft materials namely pi-gels and studied the fundamental science behind the creation of such materials, which was widely accepted by the scientific community. His research findings and publications are well cited with around 20000 citations with an h-index of 70 (Google citations).

His research contributions are recognized with several prestigious awards including the Shanti Swarup Bhatnagar Prize for Chemical Sciences (2007), the Infosys Science Prize (2012), Khwarizmi International Award 2012, the Silver Medal of the Chemical Research Society of India (2013), the TWAS Prize for Chemistry 2013 and the Goyal Prize (2019). He was a Swarnajayanti Fellow and Ramanna Fellow of the DST, Govt. India and a DAE Outstanding Researcher. He is a recepient of The Thomson Reuters India Research Front citation award and the Clarivate Analytics (Web of Scince) citation award. He is a Fellow of the three major Science Academies of India, an honorary fellow of the Kerala Academy of Sciences and a fellow of the World Academy of Sciences. Currently, he is a J. C. Bose National fellow of the DST-SERB, Govt. India.

Prof. Pratim Kumar Chattaraj, FASc., FNASc., FNA, FAScT, FTWAS

Visiting Professor, School of Basic Sciences, SRMIST

J.C. Bose National Fellow, Former Professor, IIT – Kharagpur

Prof. P.K. Chattaraj has been actively engaged in the research activities comprising density functional theory, ab-initio calculations, nonlinear dynamics, aromaticity in metal clusters, chemical reactivity, hydrogen storage and quantum trajectories. He was honored with: University Gold and Bardhaman Sammilani medals; INSA (Young Scientist) medal; CRSI Bronze and Silver medals; IAAM medal ; Acharya P.C.Ray Medal (ICS); Prof. Sadhan Basu Memorial Lecture Award, INSA; Prof. R.P.Mitra Memorial Lecture, Delhi Univ.; Prof.S.K.Siddhanta Memorial Lecture, Burdwan Univ.; Associate, Indian Academy of Sciences; BM Birla Science Prize; BC Deb Memorial award, Acharya Prafulla Chandra Ray Memorial Lecture Award(NASI). He is a Fellow of The World Academy of Sciences (TWAS), Italy, Indian Natl. Science Academy; Indian Academy of Sciences; National Academy of Sciences, India; West Bengal Academy of Science and Technology; Royal Society of Chemistry, UK and FWO, Belgium.

He is Sir J.C. Bose National Fellow. He was Convener, Center for Theoretical Studies, Convener, Kharagpur Local Chapter, INSA, council member of CRSI, Dean (Faculty) and Head of the Chemistry Department of IIT Kharagpur. He is a Distinguished Visiting Professor of IIT Bombay. He was a member of the Joint Science Education Panel of the Indian Science Academies. Several of his papers have become Editors' choice /hot/most cited/most accessed/cover articles. He has published over 400 research papers / book chapters (around 22000 citations, h-index =71 ; Google Scholar), edited nine books and special issues of six journals. He is in the Editorial (Advisory) Board of a number of journals published by the American Chemical Society, Elsevier, Springer, Frontiers group, etc.

Dr. V. Subramanian, FASc, FNASc,

Visiting Professor, School of Basic Sciences, SRMIST

Former Outstanding Scientist, CSIR-CLRI, Chennai

Dr. V. Subramanian's research interests include Electronic Structure Calculations using Conventional ab initio and Density Functional Theory (DFT) Methods, Molecular Structure of Weak Complexes and Hydrogen-bonded Clusters and their Characterization using the Quantum Theory of Atoms in Molecules (QT-AIM), Molecular Self-assembly, Molecular Electrostatic Potential, Molecular Solvation and Development of Chemical Reactivity Descriptors, Applications of Molecular Mechanics and Molecular Dynamics Methods to Polymers, Biopolymers and Drug Discovery, Design and Engineering of Proteins and Metalloproteins, Quantitative Structure-Activity Relationship (QSAR) and Biological Activity/Toxicity Prediction and Design and Development of Novel Nanomaterials and their Functionalization for Catalysis and Sensing Applications. Dr. V. Subramanian has successfully completed 31 national and international projects and has more than 312 papers with an h-index of 43.

Dr. Immanuel Selvaraj Iykkiam

Professor of Practice, Dept. of Chemistry, SRMIST

Dr. Immanuel received his Ph.D. from Indian Institute of Technology, Kanpur (IIT Kanpur) and later he did his postdoctoral research work at University of Idaho, U. S. A. He is a well-respected Technology and Innovation professional having extensive experience in leading operations, projects, and staff in technology organizations. Proven track record in leading sizeable cross functional teams located across the globe providing technology solutions for product/process issues in chemical/plastics industry. Build and establish strong relationships with strategic partners (both internal and external). Open, Candid and works very well with others bring consensus from multiple parties. Core Competencies include: Innovation Management; Project Management; Innovative Problem-Solving; Product Management; Technology Scouting; Technology Licensing; Intellectual Property including US patent law.

Dr. Jagadeesh Malineni

Professor of Practice, Dept. of Chemistry, SRMIST

Aragen Life Sciences, Hyderabad, Telangana, India

Dr. Jagadeesh Malineni received his Ph.D. from Universität Bonn, Germany and carried out his postdoctoral research work at UCLouvain, Belgium, University of Pennsylvania, USA, RWTH University, Germany. He is a experienced medicinal chemist working on integrated drug discovery projects (with in vitro and in vivo biological and ADME teams) for developing the selective CDK-2 protein degraders via PROTACs. Industrial drug discovery experience with hands-experience in designing and executing multi-step synthesis, optimizing chemical processes, and scale-up of synthetic methods. Experience in handling internal as well as collaborative/client projects in dynamic environment.

Dr. Naveen Malik, Research Assistant Professor.

Dr. Naveen Malik received his Ph.D. from Indian Institute of Science Education and Research (IISER) Mohali in 2017. He was a post-doctoral fellow at Weizmann Institute of Science, Israel (2017-2023) and Northwestern University, USA (2023-2024). His research interest focuses on homogenous or Heterogeneous Catalysis, Functionalization of small organic molecules via directing group strategy, Supramolecular Chemistry, Synthesis and application of macrocyclic polyether/crown ethers, Multilayer Films: A green chemistry approach for the self-assembly of electrochromic coatings.

Dr. P. Arun Prakash, Research Assistant Professor.

Dr. P. Arun Prakash received his Ph.D. from National Taipei University of Technology in 2011. He was a post-doctoral fellow at National Taiwan University (2011-2018) and as postdoctoral research associate at Queen Mary University of London (2018-2020). Later, he worked as Research fellow at the University of Surrey, UK (2020-2023). His research focuses on introduction of crosslinking between head groups of radiation grafted polymer based anion exchange membranes for reduced water uptakes and swelling for performance and stability improvements in alkaline fuel cells and water electrolyzers.

Dr. E. Ravindran, Research Assistant Professor.

Dr. E. Ravindran received his Ph.D. from CSIR-Central Leather Research Institute in 2017. He was a post-doctoral fellow at UNCG-USA and IISc Bangalore (2017-2021) and Kyung Hee University in Seoul, South Korea (2021-2023). His research interests include Current Generation Fluorescence Materials, Synthesis of organic small/polymer fluorophores (RGB) (conventional and thermally activated delayed fluorescence (TADF), MR-TADF materials with aggregation-induced emission (AIE)) for next-generation organic light-emitting diodes (OLEDs), Perovskite Materials for LED and OPV: Design and synthesis of organic and perovskite light-harvesting and emitting materials for solar cells and LEDs.

Dr. Rahul Dev Mukhopadhyay, Research Assistant Professor.

Dr. Rahul Dev Mukhopadhyay received his Ph.D. from CSIR-National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram in 2017. He was a post-doctoral fellow at Centre for Self-assembly and Complexity (CSC), Institute for Basic Science (IBS), Pohang University of Science and Technology (POSTECH), South Korea (2017-2020). Later he joined as an Assistant Professor at Ramananda College, Bishnupur through the West Bengal College Service Commission, Government of West Bengal (2020-2024). His research work was directed towards the development of stimuli-responsive coordination polymers, metallogels and design of superhydrophobic surfaces, Supramolecular Chemistry, Systems Chemistry, Organic Cages and Stimuli-Responsive Materials

Dr. Sivaramapanicker Sreejith, Research Assistant Professor.

Dr. Sivaramapanicker Sreejith received his Ph.D. from CSIR National Institute for Interdisciplinary Science and Technology in 2010. He became Alexander von Humboldt Fellow at Humboldt University, Germany (2010–2011). He then moved to Nanyang Technological University, Singapore (2011–2017) and National University of Singapore (NUS), as a Senior Research Fellow at the Institute for Health Innovation and Technology-NUS, Singapore (2017–2019). He joined as visiting faculty at the School of Energy Materials, Mahatma Gandhi University, Kerala. Then he joined as a Visiting Scientist at Polymer Science and Rubber Technology, Cochin University of Science and Technology. His research interest includes the study of molecular materials for applications in bioimaging and biosensing, Functional Materials, Biophotonics, Ultra-sensitive Biosensors.

Dr. B. Vedhanarayanan, Research Assistant Professor.

Dr. B. Vedhanarayanan received his Ph.D. from AcSIR, CSIR-National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram in 2017. He was a Ministry of Science and Technology (MOST) post-doctoral fellow at Tunghai University, Taiwan (2017-2022) and Chiba University, Japan (2022-2024). His research focuses on self-assembled functional hybrid materials of carbon allotropes and extended π-systems, organic-inorganic hybrids of 2D materials, and functional molecules/conducting & redox-active polymers. His work spans various applications including smart surfaces, energy conversion and energy storage devices.

Academics - Mathematics

The fifth edition of the International Conference on Mathematical Techniques and Applications (ICMTA) took place at SRMIST from January 2nd to January 6th, 2024, organized by the Department of Mathematics, College of Engineering and Technology, SRMIST.

Workshop on Scientific Computing, Modeling and Deep Learning (WSCMDL) took place at SRMIST from January 2nd to January 6th, 2024, organized by the Department of Mathematics, College of Engineering and Technology, SRMIST.

The annual Engineering Mathematics Festival was held on 9th February 2024. Students from various institutions, across the country, participated in EMF-2024. The Chief guest of the event was Mr. P. Sasikumar, Project Manager , Ford GTBC ELCOT SEZ, Chennai.

International Women's Day was celebrated at the Department of Mathematics as an exclusive women's event with a counselling talk on Unleashing HER Potential in Work-Life Balance. The chief guest of the event was Dr. P. Kaveri, M.B.B.S, M.D (COMMUNITY MEDICINE), Associate Professor, SRM Medical College Hospital And Research Centre, Kattankulathur, Chennai.

The Department of Mathematics is proud to share that our Maths Women came as the **RUNNERS** in the overall score of SRMIST International Women's day celebration of 2024. Heartiest Congratulations to all who participated in the various events and displayed their true spirit

- Dr.S.Sangeetha and Dr E.Sujatha bagged the first place for Clay Art in the IWD '24.
- Dr.E.Sujatha won the first prize for Glass painting competition held in SRMIST as part of IWD '24

Dr. R. Senthamarai served as an External Doctoral Committee Member in AMET Deemed to University on 29-02-2024.

Dr. G. Lavanya, served as a resource person in the online Webinar on Correlation and Convolution in Image Processing, organized by Paavai Engineering College (Autonomous), Namakkal, Tamil Nadu.

Dr. R. Senthamarai participated in the Awareness Cycle Rally conducted by SRMIST under the Unnat Bharat Abhiyan 2.0 Outreach Programme.

Dr. R. Senthamarai won the Third Place in Tamil Debate in IWD – SRMIST.

Dr. D. K. Sheena Christy delivered the Keynote Address as a special guest in the One Day Seminar organized by Dr. Ambedkar Govt. Arts College, Chennai on 14-03-2024.

Dr. D. K. Sheena Christy received the Top Performer Award on completion of the online course Overview of Geographical Information System organized by Indian Institute of Remote Sensing, Dehradun.

Dr. V. Subburayan, Dr. R. Mahendran, Dr. V. Raja visited IIT Roorkee during March 08-10, 2024 in regard to the International Conference on Computations and Data Science.

Dr. Bapuji Pullepu actively participated in the NAAC Campus Cleanliness Team for SRMIST during the NAAC Visit April 04-06, 2024.

Ms. Jenita Mary [PhD-SRMIST] has been offered the post of Assistant Professor at Rajalakshmi Institute of Technology, Chennai in March 2024.

Ms. Harshini Vhalli S, II M.Sc., Mathematics, has cleared the clearing the TCS-National Qualifier Test (NQT) under the SRMIST Campus Placement Programme.

Mr. Sumanta Shagolshem, [Ph.D. - SRMIST], has been offered Post Doctoral Fellowship by Amrita Vishwa Vidyapeetham, Bengaluru Campus, Karnataka on 06-02-2024.

Newly Joined Faculty Members

Dr. S. Celine Prabha is an accomplished assistant professor in the Department of Mathematics at SRM Institute of Science and Technology. She holds a Bachelor's degree in Mathematics from Holy Cross College, Trichy, where she was a class topper. She earned her M.Sc and M.Phil degrees in Mathematics from St. Joseph's College, Trichy, where she was awarded a gold medal for her outstanding academic performance. She has completed her Ph.D. in Mathematics from The Gandhigram Rural Institute - Deemed to be University. With over five years of teaching experience and four years of research experience, she has made significant contributions to the field of graph theory. She has published numerous articles in reputable journals and is recognized for her expertise in this area. In addition to her research, she has delivered many lectures on graph theory and its applications, sharing her knowledge with mathematics students and fostering their interest in this dynamic field.

Dr. Animesh Roy is an accomplished assistant professor in the Department of Mathematics at SRM Institute of Science and Technology. He holds a Bachelor's degree in Mathematics from Burdwan University, West Bengal, graduating with first-class honors. He earned his M.Sc. degree in Mathematics from IIT Delhi and completed his Ph.D. in Mathematics from Visva-Bharati, a Central University in West Bengal. Dr. Roy has one year of post-doctoral experience and seven years of research experience. His research focuses on nonlinear dynamical systems, chaos theory, cryptography, and network security. He has published numerous articles in reputable journals and is recognized for his expertise in these areas. Additionally, his work includes developing secure federated learning methods for medical imaging, aimed at ensuring the privacy and security of sensitive medical data while enabling collaborative model training across multiple institutions.

Academics - Physics and Nanotechnology

Release of Conclave souvenir by the Chief Guest and Guest(s) of Honor.

Inaugural address by Prof. Umesh Waghmare, President, the Indian Academy of Sciences.

National Physicists' Conclave 2024, February 07-10, 2024, *Organized by* Department of Physics and Nanotechnology, SRM IST, Kattankulathur:

The conclave featured 106 thought-provoking talks by eminent physicists, delving into diverse facets of physics that span both fundamental principles and innovative applications. Two enriching panel discussions ignited conversations on "Indian Women in Physics - Breaking Barriers" and "Physics and Technology Fusion: Shaping India's Innovation Landscape," provided a multidimensional exploration of our field. Also, the conclave had the much-anticipated interaction meeting with the Prestigious Shanti Swarup Bhatnagar Awardee for the year 2022, a special session on national and international funding opportunities, and the NPC2024 special awards proudly sponsored by reputable organizations such as Applied Physics Letters, Institute of Physics UK, ACCMS and AOARD.

Panel discussion on "Physics and Technology Fusion: Shaping India's innovation Landscape" with distinguished physicists (Prof. G. Baskaran, Prof. Arindam Ghosh, Prof. Annapurni Subramaniam, Prof. Rohini Godbole, Prof. Parameswaran Ajith, Prof. Mayan Srivastava and Dr. Sankalp Singh).

Research Colloquiums:

Four colloquiums were held with talks by: Dr. Biplab Sanyal, Division Head, Materials Theory Division Director, International Master program in Materials Science, Department of Physics and Astronomy, Ångströmlaboratoriet, Uppsala University, Uppsala, SWEDEN, our faculty members - Dr. G. Bharath & Dr. Sougata Mallick, and PhD Student Miss. P. Gayathri (SRF).

Dr. Biplab Sanyal from Uppsala University, SWEDEN on 20-03-2024

Dr. G. Bharath on 31-01-2024

Dr. Sougata Mallick on 14-02-2024

Value added courses:

A value added course entitled "CSIR-NET/GATE Preparatory Course" offered to final-year MSc (Physics) students aimed at preparing them for PhD admission in premier Indian institutes such as IIT/NIT/IISER has been successfully completed with 30 hours duration spanned over the entire even semester including four assessment components. More than 75% of the students have completed the course successfully.
(Course co coordinators: Dr. P. Sivakumar & Dr. Jaivardhan Sinha)

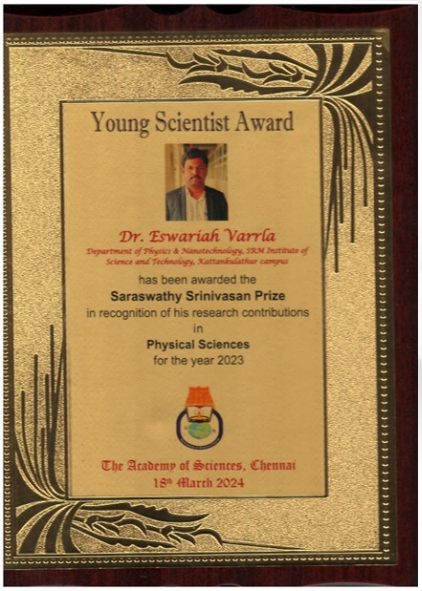
Memorandum Of Understanding:

A New MoU signed on 5th March 2024 for an indefinite period by SRMIST with the World Wide Lightning Location Network (WWLLN), University of Washington, USA (coordinated by Dr. Naga Rajesh)

Awards/ recognitions / honours received by Faculty & Students:

Faculty members:

Name	Award/recognition /honor	Awarding agency/event
Dr. Eswaraiah Varrla	Saraswathy Srinivasan Prize (Young Scientist Award) I n Physical Sciences	Academy of Sciences Chennai
Dr. G. Devanand Venkatasubbu, Dr. M. Alagiri, Dr. M. Navaneethan, Dr. Harish	"Top 2% scientist by Stanford"	List of World's top 2% of Scientists published in Elsevier by Stanford University Professor.
Dr. P. Justin Jesuraj	Visiting Scientist	Dongguk University, Seoul campus
Dr. Abhay Sagade	Invitation to publish in Early Career Forum	ACS Applied Electronic Materials, American Chemical Society.
Dr. S. Venkataprasad Bhat	Fellow of Royal Society of Chemistry	Royal Society of Chemistry, UK



Miss Rohini Anandan, (Thesis Adviser: Prof. P. Malar), has been awarded Third place (Certificate and cash prize of INR 5000) in the Three minutes thesis competition, at the International conclave for Women in STEM, organized by Agaram Foundation in association with Centre for Empowerment of Women, Anna University and Mullai Academia International, held at Anna University, Chennai, Tamil Nadu, India-600025, on March18th and 19th 2024.

Mr. Marvaan M S attended and received best poster presentation award International Conference on Microbiological Research: Current Challenges and Future Perspectives (ICMR: CCFP-2024), Bharathidasan university, Trichirapalli.

Ms. Priyanka M (RA2232006010005, M.Sc. Physics) qualified in GATE 2024.

Mentor's page

Dr. Rohit Dhir, Theoretical High Energy Physics Group In-Charge,
Research Associate Professor, Department of Physics and Nanotechnology

I am sharing my experience in mentoring undergraduate and postgraduate project students. Based on my interactions and experiences, I have learned a lot throughout the process. In my opinion, a mentor should possess expertise and a strong understanding of the field or area in which they are providing guidance. Since no two individuals are the same, mentees approach with different sets of skills, needs, and goals. Therefore, it is important for mentors to be aware of the current needs of the field and act accordingly. This enables them to offer valuable guidance and insights to their mentees. In addition to expertise, mentors can draw from their professional and personal experiences to share real-world examples and advice with their mentees. Effective communication plays a vital role in mentoring, as students can easily lose direction and have access to various sources of advice. Patience is also crucial from both the mentor and mentee. Building a mentoring relationship takes time, as the mentee needs to learn and trust the mentor. From the mentee's perspective, it is important for them to be enthusiastic and maintain a positive attitude. This helps in setting both short-term and long-term goals. Lastly, commitment from both the mentor and mentee is of utmost importance. A good mentor should be willing to invest the necessary time and energy to help their mentee succeed.

UG & PG project students guided

Publication by UG and PG students

5 publications by the project students of Dr. G. Devanand Venkatasubbu:

V. Ken Hiytesh, Dinesh Sivalingam, J.Prakash, Marvaan .MS, Madasamy Sundar, Balashanmugam P, G. Dnand Venkatasubbu, “Accelerated wound healing by PrO2 incorporated PVA/SA fibers”, Journal of Industrial and Engineering chemistry, (2024) (IF = 6.1) Accepted.

R. Gagana Rao, Ajay S. Kumar, D. Prema, J. Prakash, P. Balashanmugam, G. Devanand Venkatasubbu, “GO/CaCO3/SiO2 nanocomposite incorporated Carrageenan/Chitosan injectable hydrogel for enhanced hemostasis”, Inorganic Chemistry Communications, 161 (2014) 112024 (IF = 3.8).

S Baishal, J Prakash, MS Marvaan, Madasamy Sundar, Balashanmugan Pannerselvam, G Devanand Venkatasubbu, “Naringin and graphene oxide incorporated Moringa oleifera gum/poly (vinyl) alcohol patch for enhanced wound healing”, International Journal of Biological Macromolecules, 259 (2024) 129198 (IF = 8.2)

Ajay. S. Kumar, D. Prema, R. Gagana Rao, J. Prakash, P. Balashanmugam, T. Devasena, G. Devanand Venkatasubbu, “Fabrication of Poly(lactic-co-glycolic acid)/gelatin electro spun nanofiber patch containing CaCO3/SiO2 nanocomposite and quercetin for accelerated diabetic wound healing”, International Journal of Biological Macromolecules, 254 (2024) 128060 (IF = 8.2) (Citation = 1).

Mohamed Amsath Haseef. H, Dinesh. S, J. Prakash, Marvaan. M. S, Sundar Madasamy, Balashanmugan Pannerselvam, G. Devanand Venkatasubbu, “Calcium Oxide/Silica nanocomposite and L. Coromandelica bark incorporated κ-carrageenan/sodium alginate hydrogel for rapid hemostasis”, International Journal of Biological Macromolecules, 254 (2024) 127951 (IF = 8.2).

Newly Joined Faculty Members

Dr. Banasree Sadhukhan, Research Assistant Professor

Dr. Banasree Sadhukhan joined SRM Institute of Science and Technology as a Research Assistant Professor in the Department of Physics and Nanotechnology in April 2024. Before that, she was a postdoctoral researcher at Leibniz Institute for Solid State and Materials Research, Germany for 2 years and then KTH Royal Institute of Technology Sweden for 3 years, having a total of 5.6 years of research experience after her Ph.D. in 2018 from the Presidency University, India. She received the woman scientist (WISE-PDF) grant from DST, India government in 2023 from Tata Institute of Fundamental Research, Hyderabad, India. Currently, she is working on two challenging directions in computational condensed matter physics, collaborating with many national and international researchers. One is on “Topological transport in quantum materials” and the other is on “Light matter interactions in Skyrmions” for future low-energy electronic transport in modern technologies. Besides, she is also working on renewable energy-harvesting quantum technologies for achieving a sustainable society.

Shri. Sarin Sundar J K, Professor of Practice

Shri. Sarin Sundar J K, a distinguished expert in Materials Engineering, has an illustrious career spanning nearly three decades. His proficiency in Advanced Industrial and Institutional R&D and Management has been honed through his diverse experiences in multinational environments across India, Europe, and the USA. He has served in notable roles such as a Staff Process Engineer at renowned institutions like Applied Materials, and as a Scientist at ARCI and MTAB. Since January 2024, he has assumed the role of Professor of Practice. His expertise encompasses a broad spectrum, including R&D Management in materials engineering projects, Unit Process and High-Volume Equipment technology development, Technology Programs and Risk Management, and Statistical DoE. He has extensive experience in Semiconductor deposition products like PVD, ALD CVD, Thin-film and c-Si Solar manufacturing technologies, process and equipment for Lithium Metal Anodes, and Solid-State Batteries. He has played a pivotal role in New Product Development, overseeing the entire process from conception and feasibility (C&F) to High Value Manufacturing (HVM) in the aforementioned industries.

His substantial contributions to the field are evident in his US patent applications and publications. He has successfully pioneered numerous laser applications for mission-critical programs and industries and has collaborated with various Fraunhofer labs and leading universities and national labs across California and Germany throughout his career. His experience also extends to High power Laser Materials Processing (including laser welding, drilling, cutting and surface engineering) for aerospace and automotive industries, and a comprehensive range of Materials characterization and defect metrology in materials engineering, thin-films, semiconductors, batteries, and solar energy.

He is currently collaborating with the research faculty of the department to bring the latest knowledge on Quantum technologies, Semiconductor technologies and Industry-Academia Collaborations in these fields.

Dr. Arnab Ganguly, Research Assistant Professor

Dr. Arnab Ganguly is an accomplished material scientist who specializes in experimental as well as simulation studies of micro/nano structured materials. He investigates plasmonic and magnetic properties of material for sensor and data storage applications. Dr. Ganguly has expertise in various imaging and micro/nano fabrication techniques.

Career: Dr. Arnab Ganguly has been serving as a research assistant professor at SRM University since March 2024. Before joining SRM University, he held the position of research scientist at Khalifa University in the United Arab Emirates. Prior to that, he conducted postdoctoral research at prestigious institutions such as Uppsala University in Sweden, KAUST in Saudi Arabia, and NUS in Singapore. In 2016, Dr. Ganguly earned his Ph.D. from the Satyendra Nath Bose National Centre for Basic Sciences in India.

Research summary: Dr. Ganguly has authored 17 papers in renowned international journals. His doctoral research delved into the magnetic damping phenomena observed in bi-layer thin films. The central theme of his thesis involved exploring the modulation of damping in a magnetic system and its detection through both all-electrical and all-optical means. The findings of his research have significant implications for the development of next-generation computation technology, particularly in the realms of data storage and data transfer applications. During his postdoctoral experience, Dr. Ganguly conducted research on magnetic bubbles and skyrmion dynamics to explore their potential applications in race track memory and logic devices. Additionally, he focused on the development of distinctive 3-D plasmonic nano-crystals using hybrid-nanosphere lithography methods, with the aim of applying them in biomedical and environmental sensor technologies.

Future research interest: Dr. Ganguly's future research interest focuses on investigating the spintronic, plasmonic, and magnonic properties of metallic nanocrystals. Drawing from his previous experience, he plans to leverage the electromagnetic and spin transport characteristics of a system for various optoelectronic purposes. He is enthusiastic about exploring nanosphere lithography as a fabrication method, which offers simplicity, affordability, environmental friendliness, and scalability within the industry. Nanostructured films will be employed as optical/electronic filters, attenuators, and oscillators, holding great potential in applications such as bio-sensors, smart windows, heat dissipation, logic devices, and computer M-RAM.

Research—Chemistry

Number of Journal publications : **79**
Average Impact Factor : **5.96**
Highest Impact Factor Journal published **: 20.6**

Highest impact factor paper:

Sajith Babu M. K, Yeoung-Sang Yun, and **Srinivasarao Kancharla**, Covalent organic frameworks for critical metal recycling from waste, Coordination Chemistry Reviews, 507, 2024, 215699. **(Impact Factor = 20.6)**

Nature indexed publications : (5)

Velusamy Jeevanathan, **Gopal Chandru Senadi**, Kesavan Muthu, Ajithkumar Arumugam, and **Swaminathan Shanmugan,** Construction of Indium(III)–Organic Framework Based on a Flexible Cyclotriphosphazene-Derived Hexacarboxylate as a Reusable Green Catalyst for the Synthesis of Bioactive Aza-Heterocycles, Inorganic Chemistry, 63 (12), 2024, 5446-5463. **(Impact Factor = 4.6)**

Roshini Arulraj, Karthik Eswaran, Sara Fidha C. M, Rajini Murugesan, Slida Peters, **Arthanareeswari Maruthapillai, Sethumathavan Vadivel, Rajendra Kumar Konidena, Tumpa Sadhukhan,** and Anantharaj

Sengeni, Chemical Communications, 2024. **(Impact Factor = 4.9)**

Brendan Kerwin, Stephanie E. Liu, **Tumpa Sadhukhan**, Anushka Dasgypta, Leighton O. Jones, Rafael Lopez-Arteaga, Thomas T. Zeng, Antonio Facchetti, George C. Schatz, Mark C. Hersam, and Tobin Jay Marks, Angewandte Chemie International Edition, 2024. **(Impact Factor = 16.6)**

Sruthy Subash, Kumaresan Lakshmanan, **Kumaran Vediappan**, K. Kamala Bharathi, High Li-ion diffusion coefficient in $LiMn_{1.5}Ni_{0.5}O_4$ thin films for all-solid Li-ion battery applications, Applied Physics Letters, 124, 2024, 023903. **(Impact Factor = 4.0)**

Mingzhan Wang, **Tumpa Sadhukhan**, Nicholas H. C. Lewis, Maoyu Wang, Xiang He, Gangbin Yan, Dongchen Ying, Eli Hoenig, Yu Han, Guiming Peng, One-Sun Lee, Fengyuan Shi, David M. Tiede, Hua Zhou, Andrei Tokmakoff, George C. Schatz, and Chong Liu, Anomalously enhanced ion transport and uptake in functionalized angstrom-scale two-dimensional channels, Proceedings of the National Academy of Sciences of the United States of America, 2024. **(Impact Factor = 11.1)**

Total number of Ph.D. completed: 5

Ms. H. Leelavathi (RA2033003011015)

Mr. M. M. Tamilvelan (Reg. No. RA1933003011020)

Ms. Gawas Pratiksha Prakash (RA1933003011009)

Ms. R L Madhumathi (RA1933003011041**)**

Ms. Kasthuri (RA1733003011041)

Research Projects : 4

Total grant outlay of the below mentioned projects **: 82.39 lakhs INR**

Sl. No.	Name of the PI	Title of the project	Agency/ Sanction File No.	Grant Amount (in lakhs)	Period of support
1.	Dr. P. Gopinath	Technology development for scalable, cost-effective drugs/ natural products isolation from cordyceps militaris and medicinal plants: their semi-synthesis and antimicrobial lead identification	EAC AMR-TC	45.20	2024-2027
2.	Dr. Soumyajit Ghosh	Self-healing Non-linear Optical Crystals as New Materials for All-Organic Photonic Integrated Circuits, TPN-91712	Indo-Russian Proposal	12.00	2024-2027
3.	Dr. G.T Senthil Andavan	Sustainable hybrid isocyanate free polyhydroxyurethanes from renewable precursors	CRG/2023/008762	15.19	2024-2027
4.	Dr. M. Mariappan	Synthesis Of Marine-Derived Bis And Tris-Indoline Alkaloids Facilitated By Visible Light Induced P-Block Metallocorroles As Photoredox Catalysts	TAR/2023/000464	10.00	2024-2027

Total Number of patents : 7

Patents Granted: 3

S.No.	Patent Application Number	Inventors (Name of Faculty/Students)	Patent Title	Date of Grant
1.	522289	**Helen Annal Therese**, and Eswara sarma	A Process For Preparing Bimetallic Nanoalloy	08.03.2024
2.	525710	J.M.Abisharani and **S.Devikala**	A Method Of Preparation Of Anode Material Using Fruit Extract For Dye Sensitized Solar Cell	14.03.2024
3.	521697	**Arthanareeswari Maruthapillai**, Dasameswara Rao Kavitapu and S V Narasayya	Polymorphs of Succinic Acid and A Process for Their Preparation	07.03.2024

Patents Published: 4

S.No.	Patent Application Number	Inventors (Name of Faculty/Students)	Patent Title	Date of Published
1.	202441001217A	**Kalaivizhi Rajappan**, Bose Neeraja	A Polymer Film composition and a process for its preparation	02.02.2024
2.	202441004148	**K. K. R. Datta**, Senthil Kumar, Iniya Prasanthi	Fluorinated Graphene Nanosheet Based Zeolitic Imidazolate Framework And A Process For Its Preparation	09.02.2024
3.	202441018225 A	**Sundaravadivel Elumalai**, Ramya Ravichandran, Kumaresan Annamalai, Arun Annamalai	A Trimetallic Nanocomposite and a process for its Preparation	29.03.2024
4.	202441005844A	**Prasant Kumar Nayak**, Nechikott, Aneesh Anand	A Dual Cation Electrolyte System and a Process for its Preparation	09.02.2024

Faculty Achievement

A recent research work by **Dr. S. Shanmugan**, Associate Professor, Department of Chemistry on metal-organic framework (MOF) got accepted in Inorganic Chemistry (ACS, Nature Index journal, IF: 4.6). In this article, a new Indium-MOF was synthesized and reported on the name of our institute as SRMIST-1. This is very noteworthy as any researcher who works on such MOFs around the world should be called with the name given in the original paper. For example, hereafter this Indium-MOF will be called as SRMIST-1 by researchers around the world.

Student Achievements

The following students received a best poster award

Ms. SARAL SESSAL S (RC2333003011002) (Research Scholar) received a gold medal for the best paper award in Research Day (4.3. 2024) at SRMIST.

Mr. G. Muthukumar (RC2133003011018) (Research Scholar) received a silver medal for the best paper award in Research Day (4.3. 2024) at SRMIST.

Ms. Nasrin Banu G (RA2233003011020) (Research Scholar) received a silver medal for the best paper award in Research Day (4.3. 2024) at SRMIST.

The following research scholars won best paper award in Dr. Parrivendhar Research Colloquium (DPRC) conducted on 28.3.2024:

Ms. S. Crescentia Yazhini (RA2133003011017)

Ms. Sindhu I Sanakal (RC2333003011013)

Mr. Giri Lakshman N (RA2233003011032)

Mr. Tamil Selvan K (RA2133003011013)

Mr. Jenny Johnson (RA2133003011038)

Ms. Miriam Daniel (RC2133003011028)

Mr. Prasanth P (RA2033003011007)

Ms. S.M. Esther Rubavathy (RA2133003011026)

Mr. Marimuthu S (RC2133003011014)

Mr. Bharathi Kannan R (Research Scholar) received a the best paper award for a paper titled "Activity enhancement of triazine based confugated Polymer by functionalizing with metal vanadate" in National Convention of Electrochemists (NCS 2023), SRMIST.

Ms. Sree Lakshmi (Research Scholar), SRMIST received a best paper award titled "Microencapsulation of struvite ($MgNH_4PO_4.6H_2O$) fertilizer recovered from wastewater using Microbial fuel cell Technology" in 8th International Conference on Recent Advancements in Chemical, Environmental & Energy Engineering (RACEEE2024) in Sri Sivasubramaniya Nadar College of Engineering, on 15-16, Feb. 2024.

Mr. A. Tharun, Ms. Harshiniya R and Ms. Sujesh Pranav A.S. B.Sc. Chemistry students won the second place in **Treasure Hunt** conducted by the Department of Chemistry (SFS), Madras Christian College on 7th March 2024 during the intercollegiate fest, Chem Fiesta '24.

Ms. Sivaranjani P , B.Sc. Chemistry student won the second place in **Chem Rangoli** conducted by the Department of Chemistry (SFS), Madras Christian College on 7th March 2024 during the intercollegiate fest, Chem Fiesta '24.

ICRAMC-2024

Ms. Richu Baghya Varsa, Research Scholar, received a best oral presentation award titled "Exploring the properties of novel zwitterionic cocrystal and metal salts of lipoprotein-lowering drug Pravastatin" in ICRAMC 2024, SRMIST held during 15-17, February 2024.

Ms. Swathi. J, B.Sc. Chemistry student, received a best oral presentation award title "A Study of the Synthesis and Optical Properties of Poly (Aryl Ether Nitrile) s with Porphyrin-Infused Backbones"in ICRAMC 2024, SRMIST held during 15-17, February 2024 .

Ms. Gowri Chandran C V, Research Scholar received a best poster presentation award titled "Solution Processed Interfacial Layers for Organic-Inorganic Hybrid Perovskite Solar Cells" in ICRAMC 2024, SRMIST held during 15-17, February 2024.

Mr. Sanjay Kumar, Research Scholar received a best poster presentation award titled "Electing a Suitable Ionic liquid for Stabilizing Uio-66: A Computational Study" in ICRAMC 2024, SRMIST held during 15-17, February 2024.

Mr. Subash. M, Research Scholar received a best poster presentation award titled "Exploring the feasibility of utilizing dye-contaminated effluent wastewater for plant growth: win-win situation of non-thermal plasma assisted dye destruction and nitrogen fixation in wastewater " in ICRAMC 2024, SRMIST held during 15-17, February 2024.

Mr. Aditya Prabhakaran, M.Sc. Chemistry student received a best poster presentation award titled "Designing Metal Oxide @ C-dots Heterojunctions as Visible-light Photocatalytic Degradation and Security Informations" in ICRAMC 2024, SRMIST held during 15-17, February 2024.

Mr. Abinash B, M.Sc. Organic Chemistry student received a best poster presentation award titled "N-heterocyclic carbene-metal complexes of phosphorous (V) imidazolium salt precursors: synthesis, characterization and catalytic reactions" in ICRAMC 2024, SRMIST held during 15-17, February 2024.

Mr. Giri Lakshman , Research Scholar received a best poster award titled " Effect of Mixture of Ionic Liquids and Water on the structure and stability of Insulin Dimer: A combined DFT and MD Simulation Study at the Theoretical Chemistry Symposium 2023 in IIT Madras held during 07-10, December 2023.

Research Internship:

Ms. Esther Rubavathy Stanley Moses, (Reg. No RA2133003011026), PhD research scholar was selected for research internship for a period of 6 - 10 months starting in August 2024 to do a collaborative project entitled "Computational molecular modeling of new drugs targeting neurodegenerative diseases, such as Parkinson's disease and Alzheimer's disease" under the guidance of **Dr. Lyudmila V. Slipchenko**, Professor of Chemistry in **Purdue University, USA.**

Mr. M. Vinoth Inbaraj, Research scholar, Department of Chemistry was awarded with DST-Inspire fellowship (IF220620) for research students.

TEEP:

The following student is selected for TEEP program:

Mr. Jithin Rafi (Reg. No. RA2133003011016) Research Scholar, 2021 batch received Short-Term Research Internship on Taiwan Experience Education Program (TEEP) at National University of Technology (Taipei Tech) at Taiwan under Tzyy-Jiann Wang's Laboratory to carry out an internship for a period of 5 months (5.2.2024 – 15.7.2024).

Research—Mathematics

Number of Journal publications : **89**

Average Impact Factor : **2.28**

Highest Impact Factor Journal published **: 5.4**

Highest impact factor paper :
Arul Joseph Gnanaprakasam, Balaji Ramalingam, Gunaseelan Mani, Ozgur Ege, Reny George, A Numerical Scheme and Application to the Fractional Integro-Differential Equation Using Fixed-Point Techniques, Fractal and Fractional. 8(1):34, 2024, https://doi.org/10.3390/fractalfract8010034 **(Impact Factor = 5.4)**

Number of Ph.D. Completed: 3

Research Projects :
Total number of new grants received : **1**
Total outlay of the above mentioned project **: 18.30 lakhs INR**

Sl. No.	Name of the PI	Title of the project	Agency/ Sanction File No.	Grant Amount (in lakhs)	Period of support
1.	Dr. Swaraj Paul	Microlocal analysis on the Heisenberg group and its intertwining properties with shearlets	TAR/2023/000262	18.30	2024-2027

Total number of Book Chapters: 3

Dr. R. Senthamarai – book chapter – A Non-linear Prey-predator Model: Detailed Analysis by HPM and HAM – in the book – Research Trends in Mathematics and Statistics – Volume 25. ISBN: 978-93-5570-861-8

Dr. R. Senthamarai – book chapter – Approximate Analytical Solution of Enzyme Kinetics in Hydrolysis of Miscanthus and Oat Hulls: HAM and HPM – in the book – Research Trends in Mathematics and Statistics – Volume 25. ISBN: 978-93-5570-861-8.

Dr. N. Balaji, Springer – Book Chapter

Value Added Course:

Dr. G. Lavanya, Dr. E. Sujatha from the Department of Mathematics and Dr. M. Susila from the Department of ECE, are the coordinators for the value added course ECV0703T Mathematical insight to machine vision.

Research—Physics and Nanotechnology

Number of Journal publications : **84**

Average Impact Factor : **5.64**

Highest Impact Factor Journal published : **15**

Highest impact factor paper:

P.N. Blessy Rebecca, D. Durgalakshmi, S. Balakumar, **R. Ajay Rakkesh**, Enhancing self-powered wearable device performance: ZIF-8/rGO hybrid nanostructures for extended operation and electrochemical glucose detection, Chemical Engineering Journal (2024) https://doi.org/10.1016/j.cej.2024.149789
(Impact Factor = 15)

Nature Indexed journal publications (6):

Sruthy Subash, Kumaresan Lakshmanan, Kumaran Vediappan, **K Kamala Bharathi ,** High Li-ion diffusion coefficient in $LiMn_{1.5}Ni_{0.5}O_4$ thin films for all-solid Li-ion battery applications, Applied Physics Letters, https://doi.org/10.1063/5.0178190 **(Impact Factor = 4.0)**

I. Silber, **S. Mathimalar**, I. Mange, A. K. Nayak, O. Green, N. Avraham, H. Beidenkopf, I. Feldman, A. Kanigel, A. Klein, M. Goldstein, A. Banerjee, E. Sela & Y. Dagan Two-component nematic superconductivity in 4Hb-TaS_2, Nature Communications, https://doi.org/10.1038/s41467-024-45169-3 **(Impact Factor = 16.6)**

Tharani Selvam, Durgalakshmi Dhinasekaran, Balakumar Subramanian, and **Ajay Rakkesh Rajendran***, Enhancing Interplanar Spacing in V_2O_3/V_3O_7 Heterostructures to Optimize Cathode Efficiency for Zn-Ion Batteries, The journal of physical chemistry letters, https://doi.org/10.1021/acs.jpclett.3c03590 **(Impact Factor = 5.7)**

Priyadharshini, S., V. Vijay, S. Kamalakannan, **J. Archana, M. Navaneethan**, Realizing an ultralow thermal conductivity via interfacial scattering and rational-electronic band reformation in p-type Mg_3Sb_2, Applied Physics Letters, https://doi.org/10.1063/5.0180722 **(Impact Factor = 4.0)**

Tharani Selvam; Durgalakshmi Dhinasekaran; Balakumar Subramanian; **Ajay Rakkesh Rajendran**, High-performance aqueous zinc-ion battery cathodes: Enhanced performance with V_2O_5/graphene sandwich-like heterostructures featuring structural defects, Applied Physics Letters, https://doi.org/10.1063/5.0192236 **(Impact Factor = 4.0)**

Phu-Quan Pham, Truc-Quyen Thi Vo, Duy Khanh Le, Chuong Thanh Huynh, Tung Thanh Ngo, Phuong Tuyet Nguyen, Anh Tuan Thanh Pham, Nam Hoang Vu, Thang Bach Phan, **Yoshiyuki Kawazoe**, Ngoc Kim Pham, Self-rectifying resistive switching in $MAPbI_3$-based memristor device, Applied Physics Letters, https://doi.org/10.1063/5.0178032 **(Impact Factor = 4.0)**

Book chapters Published: 1

Dr. Junaid Masud Laskar, Pulsed Laser-Mediated Phototherapeutic Mechanisms for Biomedical Application, published by Springer.

Number of Patents granted: 1

MALAR Piraviperumal, SIVASANGARI Sathiamoorthy, TIWARI Kunal Jogendra,
A SOLAR RADIATION ABSORBING LAYER FOR THIN-FILM SOLAR CELLS WITH ENHANCED ABSORPTION AND A METHOD TO MANUFACTURE THE SAME, Indian patent granted on 03/01/2024.

Number of Ph.D. completed : 7

Research Projects : 7

Total lay out of the abovementioned projects **: 123.24 lakhs INR**

S. No	Name of the PI	Title of the project	Agency/Sanction File No.	Grant amount (in Lakhs)	Period of support
1	Dr. K. Mani Rahulan	A novel strategy for the development of Optical Limiting Materials using Two-dimensional (2D) MXene based nanostructures for Intense Laser Protection	DST-SERB, CRG	30.00	2024-28
2	Dr. Madhuparna Karmakar	Physics of strong correlations in flat bands	DST-SERB, CRG	20.85	2024-28
3	Dr. Saurabh Ghosh (PI), Dr. Madhuparna Karmakar (co-PI)	Design of Mott Multiferroic materials by tuning quantum correlation effects	DST-SERB, CRG	30.00	2024-28
4	Dr. R. Ajay Rakkesh	Development of electrochemically active graphene electrodes for Zn-Ion Batteries	UGC-FRPS	8.00	2024-27
5	Dr. S. Harish (PI), Dr. M. Navaneethan (co-PI)	Design and development of Silver-based wearable thermoelectric generator for self-powered health monitoring devices	DST-SERB, CRG	32.00	202427
6	Dr. R. Ajay Rakkesh	Investigating Intercalation in Vanadium based Layered Oxides through Soft X-ray Absorption Spectroscopy for Fast-Charging Aqueous Zinc-Ion Batteries	UGC-DAE Consortium for Scientific Research (CSR)	1.95	2024-25
7	Dr. P. Malar	Comparative Spectroscopic Studies on the Band Alignment of CdS/Sb_2Se_3, SnO_2/Sb_2Se_3 and TiO_2/Sb_2Se_3 Heterojunctions for Thin Film Solar Cell Applications	UGC-DAE Consortium for Scientific Research (CSR)	0.44	2024-25

New facilities added:

Spin coater (UB1210) & Keithley/2450 Interactive Digital Source Meter (RRP 601).
Faculty in-charge: Dr. P. Malar, funded by DST-SERB.

LCR meter & Customized sample holder and oven with temperature controller RRP 303.
Faculty in-charge: Dr. Subhojyoti Sinha, funded by DST-SERB

Faculty Corner

Approximate of identity, Integral Equation and Wavelets

Most of the physical phenomena in real life can be modelled using Partial Differential Equations (PDEs) or Integral Equations (IEs). Depending on the problem sometimes handling the equivalent IEs is more easier than the PDEs. The simple integral equation which has tremendous application in many physical problems including water wave scattering, elasticity, potential theory, diffraction problems, scattering in quantum mechanics is Love IE, associated with the names of E. R. Love, who studied for the first time in 1949. The simple form of Love IE is as follows

$$u(x) + \frac{\alpha}{\pi} \int_{-1}^{1} \frac{u(t)}{\alpha^2 + (x-t)^2} dt = 1, \quad -1 \leq x \leq 1, \tag{1}$$

where α is a positive parameter and u is unknown function. This is regular integral equation with continuous symmetric kernel $K_\alpha(x-t)$ with $K_\alpha(x) = \frac{\alpha}{\pi}\frac{1}{\alpha^2+x^2}$ which is known as Cauchy distribution. This kernel is also called Poisson kernel on the upper-half plane (i.e., the solution of Laplace equation (LE) on the upper half plane can be written as convolution of the boundary values of LE and the kernel $K_\alpha(x)$). But the integral equation is no longer regular for very small parameter α. It is well-known for $K(x) = \frac{1}{\pi}\frac{1}{1+x^2} \in L^1(R)$, and $\int_R K(x) = 1$, the family of function $K_\alpha(x) = \frac{1}{\alpha}K(\frac{x}{\alpha})$ for $\alpha > 0$ is approximate identity.

Approximate of identity gains a lot of interest due to its rapid application in distribution theory, theory of PDEs, numerical analysis etc. It is well-known that Dirac-delta function $\delta(x)$ is identity of convolution. Since convolution is defined only on absolutely integrable functions $L^1(R)$ and Dirac-delta function is in the space of distribution which is very large class of function (dual space of infinitely differentiable function with compact support), then $\delta \notin L^1(R)$. This is why we need the concept approximate of identity. Moreover approximate of identity $K_\alpha(x)$ is a sequence of nice L^1 functions which converges to $\delta(x)$, and the convolution $(K_\alpha * f)(x)$ converges uniformly to the original function $f(x)$ for $\alpha \to 0$.

Using approximate of identity it can be shown that the solution of the Love IE is discontinuous for very small parameter α. Therefore reproducing the numerical solution is very challenging. Plenty of numerical methods are available in the literature since 1949 for solving Love IE including Nystrom method, quadrature rule, collocation method, reducing equivalent system of Fredholm integral equations, Gauss–Legendre quadrature, etc. Wavelet methods are also very effective to detect the singularity and to compute the singular integral very easily. It clearly show great promise in overcoming the limitation of traditional numerical methods.

References

[1] E. R. Love, The electrostatic field of two equal circular co-axial conducting disks, *Quart. J. Mech. Appl. Math.*, 2 (1949), pp. 428–451, https://doi.org/10.1093/qjmam/2.4.428

[2] Farina, Leandro, Guillaume Lang, and Paul A. Martin. "Love–Lieb Integral Equations: Applications, Theory, Approximations, and Computations." SIAM Review 64.4 (2022): 831-865.

By

Dr. Swaraj Paul,
Research Assistant Professor,
Department of Mathematics,
SRMIST, Kattankulathur.

Future with Lab-Grown Meat

By 2050, the global population, currently at 7.3 billion, is projected to exceed 9 billion. The Food and Agriculture Organization (FAO) predicts that meeting the food demand of this growing population will require 70% more food. However, this poses significant challenges due to resource and arable land limitations. Despite declining meat consumption in developed countries, global meat consumption continues to rise. Consumers, especially in emerging nations like China, India and Russia, are increasingly seeking luxury products such as meat and other animal-based foods.

Livestock systems are essential for global food and nutrition security. To achieve this, animal farming must produce abundant, high-quality meat, milk, and eggs while maintaining environmentally sound, socially responsible, and economically viable practices. Despite the various services provided by livestock farming, a significant portion of livestock is now raised in factory farming systems. Although factory farming has a smaller environmental impact than extensive agriculture, its primary focus is on production efficiency. However, livestock production significantly contributes to global greenhouse gas emissions (14.5%–20% of total emissions), deforestation, biodiversity loss, and soil and water pollution. Overconsumption of red and processed meats also raises the risks of obesity, Type 2 diabetes, heart disease, and certain cancers. Additionally, industrial livestock production is associated with an increased risk of zoonotic diseases and rising antibiotic resistance. As a result, researchers are actively developing more efficient methods of protein production to meet the needs of our growing global population while addressing pressing challenges like environmental impact and animal welfare.

Lab-grown meat, also known as cultured, cultivated, synthetic, or cell-based meat, has garnered significant attention in the food industry over the past few years. The process of creating meat in a lab involves extracting muscle stem cells and arranging them into desired cuts of meat, eliminating the need to rely on live animals for meat production. Recent technological advancements have enabled the growth of various proteins, such as chicken, duck, steak, pork, and fish, directly from cells.

Cultured meat utilizes fat or muscle cells from an animal, which are placed into a nurturing culture, prompting their growth. When it comes to taste, cultured meat differs from traditional meat. While researchers have successfully mimicked the flavor and texture of traditional meat in lab grown versions, there may be slight differences in taste and texture. Factors like amino acid composition and the natural animal farming processes contribute to these distinctions. Commercial versions of lab grown meat are available under the brand name Good Meat from Eat Just Inc., a US based company. Figure shows the image of a lab-grown chicken developed by them and a pasta dish with the cultivated chicken meat.

Figure: Lab-grown cultured chicken developed by Eat Just (courtesy Reuters) and pasta dish with good meats cultivated chicken meat (courtesy Good Meat.co).

From a political standpoint, there has been a favorable global response to alternative meat, with several countries either researching novel alternatives to traditional livestock or offering tax breaks and subsidies to producers. Central Marine Fisheries Research Institute-India recently initiated a project aims to develop cultured marine fish meat, thereby addressing the growing seafood demand and reducing excessive pressure on marine resources.

While research projects on cultured meat have been limited in scope due to the early stage of in vitro meat development, the product is expected to evolve continuously. New discoveries and advances will optimize production, quality, and cell division efficiency. Whether this progress will make artificial meat competitive compared to conventional meat and the growing array of meat substitutes remains uncertain.

References:

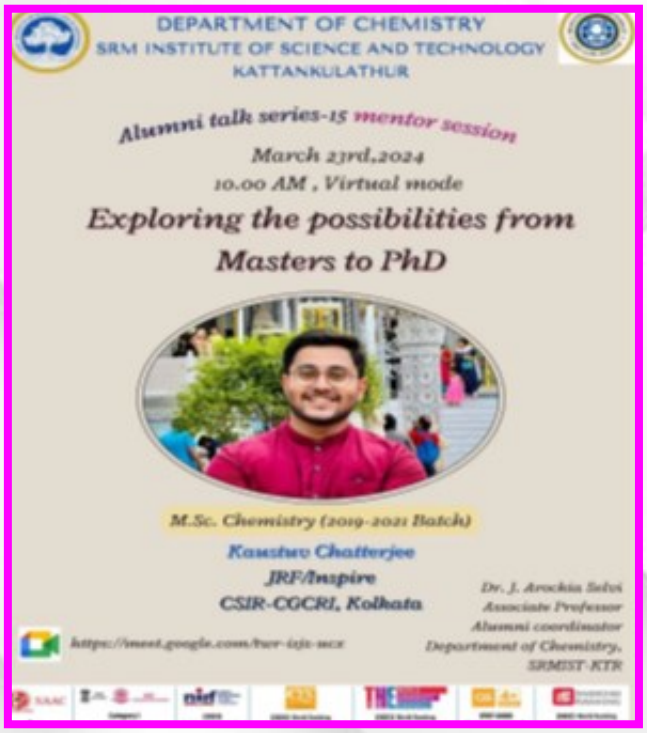
1) K. V. To, C. C. Comer, S. F. O'Keefe, J. Lahne, A taste of cell-cultured meat: a scoping review, Frontiers in Nutrition, 2024, 11, 1332765.

2) S. Chriki, J. F. Hocquette, The myth of cultured meat: A review, Frontiers in Nutrition, 2020, 7, 7.

By

Dr. Sivaramapanicker Sreejith
Research Assistant Professor
Department of Chemistry,
SRMIST, Kattankulathur.

Alumni Connect



The Department of Chemistry, SRM Institute of Science and Technology (SRMIST) organized the Alumni event – The mentor session on the topic "Exploring the possibilities from master's to PhD" on 23rd March 2024 at 10.00 am by Mr. Kaustav Chatterjee, JRF/Inspire fellowship, CSIR-CGCRI, Kolkata. (M.Sc. Chemistry. 2019-2021) in virtual mode.

The Department of Chemistry, SRM Institute of Science and Technology (SRMIST) organized the Alumni event – The mentor session on the topic " **Opportunities and Experiences through Erasmus Programs in Europe**" on 29th Jan. 2024 at 2.30 pm by Mr. Atharva Nilawar, Post Graduate student (master's in chemistry) under Erasmus Joint Master's Degree Program. (B.Sc. Chemistry. 2018-2021).

The Third International PI Day celebration was held on 14.3.2024. Dr. A. John Kaspar, Assistant Professor, Department of Mathematics, CHRIST (Deemed University), Bangalore was invited to deliver an Alumni talk on Finite Automata: Introduction and Its Practical Applications.