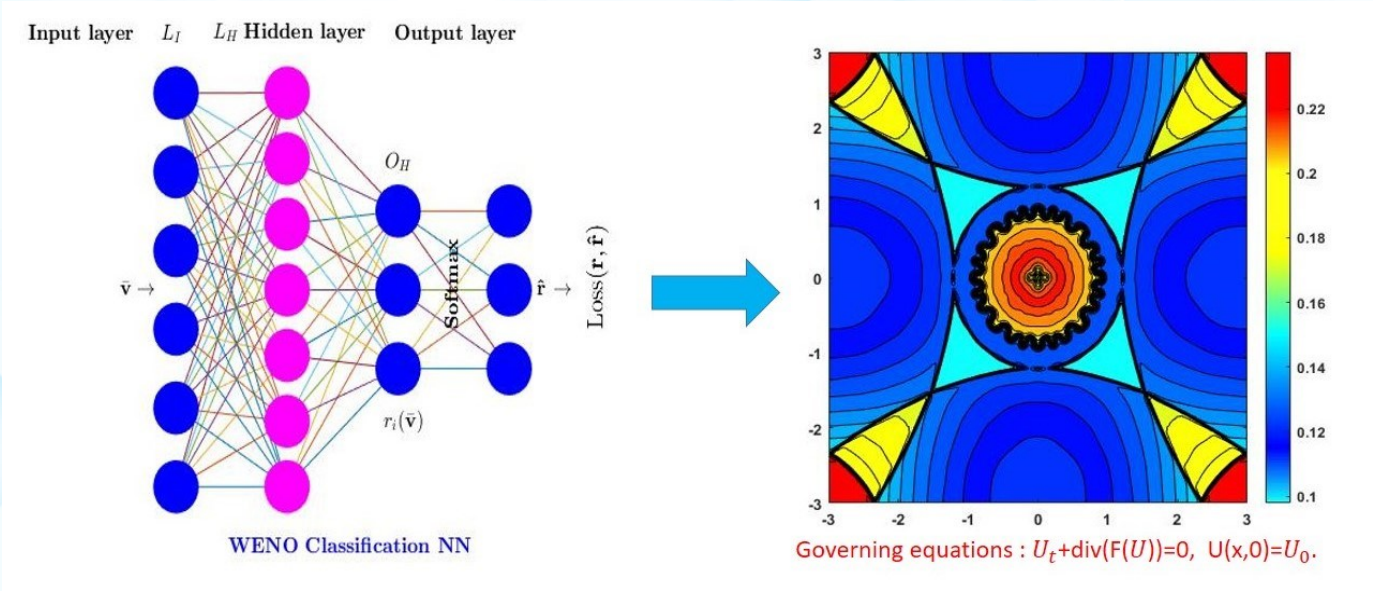
SRM INSTITUTE OF SCIENCE & TECHNOLOGY
Deemed to be **University** *u/s 3 of UGC Act, 1956*

Horizon

Quarterly Newsletter

Volume 2, Issue 2

(April to June 2023)



School of Basic Sciences

College of Engineering and Technology
SRM Institute of Science and Technology

Kattankulathur - 603 203, Chengalpattu District

Tamil Nadu, India

....Our Ranking.....

NAAC	UGC	nirf	QS	THE WORLD UNIVERSITY RANKINGS	ARIIA	SHANGHAI RANKING
A++	Category I with 12B Status	(2023) Ranked 18th University	(2023) World Ranking one among 41 Indian Universities	(2023) World Ranking one among 75 Indian Universities	(2021) Ranked 4th	(2023) World Ranking one among 14 Indian Universities

Cover page theme: Learning high order reconstructions for scientific computing. 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 very happy to see that the third issue of the newsletter "Horizon" is being released. I take this opportunity to thank all the faculty, research scholars and students for their consistent contributions in upholding the NIRF ranking of the Institute. I strongly believe that our efforts further will take the institute to attain much higher ranking in future. I congratulate the faculty and scholars for their accomplishments in publishing the high impact journals, securing the funds for carrying out research during April to June 2023. I also thank the faculty who involved in organizing the seminars and executing the outreach activities.

As the academic year started, I wish that we play key role in shaping the young students' career and ensure that they will have productive and pleasant stay at SRM IST. I suggest that the faculty should instill the students' minds with more practical knowledge to enrich their skills along with the fundamental and advanced knowledge in the frontier areas of science and technology.

I also welcome the new research scholars of the School of Basic Sciences. I am sure that they will carry out the state-of-the-art research and will be prolific in terms of publications. My hearty congratulations to the editorial team of the newsletter "Horizon".

Cover page theme: The use of vanilla feed forward classification neural network to learn the index of smoothness of underlying sampled data which subsequently used in WENO3 reconstructions and in simulating Rayleigh-Taylor instability phenomenon modelled by compressible hyperbolic conservation laws.

(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

It's our pleasure to summarize our teaching and research accomplishments for the third edition of "Horizon". We are overwhelmed to share that two of our M.Sc students secured prestigious DST-Inspire fellowship. Through this achievement, they will march towards their dream research path in IIT -Madras and CSIR-CGCRI, Kolkata. Four more M.Sc students grabbed the TEEP Fellowship, to spend a short-term research nternship in Taiwan in various research groups. During this period, 8 research scholars were awarded with their Ph.D. degree.

Two programs of School of Basic Sciences, our flag-ship event, Sci-Connect (Project Expo) and Sci-Meet (Farewell) were successfully organized. In addition to this a special talk for stress management for all the research scholars and the research supervisors of School of Basic Sciences was conducted successfully. To motivate our M.Sc students towards CSIR-UGC NET examination, a chemistry association event was conducted by our faculty member. He not only gave the secrets to crack the exams but also highlighted Do's and Dont's during the exam.

A national level electrochemistry summer school attracted 17 participants from premier institutions and industry. Participants were excited to do hands-on session by which they gained confidence to plan their research. Dr. Ravikiran Allada, Director Analytical R&D, Novugen Pharma Ltd., Malaysia, and our alumni gave eye-opening perspective about ample opportunities for our research scholars in industry. Another alumni, Dr. Priyadarshini, an Environmental Scientist, TN Pollution Control Board (TNPCB), excited our students about untapped opportunities in various government sectors, which students are scarcely aware of. This was part of alumni achievers connect program.

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

As a part of School of Basic Sciences, the department of mathematics is elated in the release of the Second Issue (Volume II) of our newsletter "Horizon". It is indeed a proud moment to share the achievements of all our students and faculties. In this period (April-June 2023), the department witnessed its publication in new high IF Journal IEEE Transactions on Fuzzy Systems (IF 12.253). Some of our faculties visited premier institutions like IIT Guwahati, IIT Mandi, TIFR to promote research collaborations. Two of our research scholars have been offered Assistant Professor positions. Some of our final year students have been placed and have been accepted for higher studies in prestigious institutions. The department congratulates all rank performers for the academic year 2022-23. The account of all the events conducted in the Department showcase the diverse nature of research professionals available in the department and various training given to the students with the guidance of the administrators. Congratulations to all the students who have qualified various exams and 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

It is my duty to acknowledge and appreciate all the faculty members, research scholars, students, and alumni for the contribution towards improving university rankings. It is a proud moment to witness the contribution by our colleagues to place our university 2nd among the Private Universities and 28th overall in India in the Nature Indexed Publications for 2022-2023. My heartfelt congratulations for the teams publishing articles in Nature indexed journals during April to June 2023. My special appreciations to our faculty members for receiving funded projects, SERB International Research Experience fellowship and travel grants. I am also very happy for the research scholars for achieving travel grants, award and internships. I wish you all success and expect you to achieve desired milestones in the academic year 2023-24.

Editorial Team

Contents

From the Editors Desk

Dear Readers,

Greetings!

We take pleasure in announcing the release of the Volume 2, Issue 2 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 (April 2023 – June 2023).

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

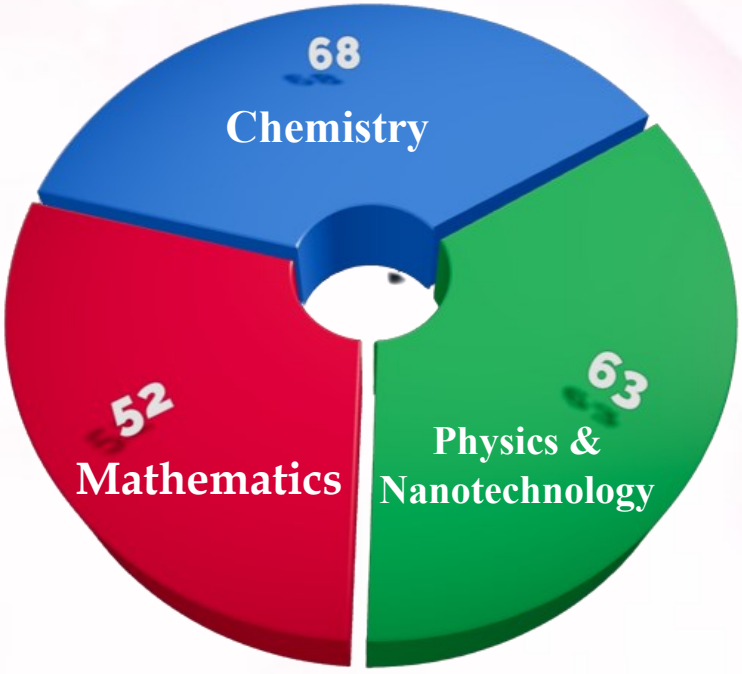
Please enjoy reading our newsletter !!

Highlights

School of Basic Sciences

Key Metrics	January to March 2023	April to June 2023
Total No. of publications (SCI/Scopus)	214	183
Highest Impact Factor Journal Publication	24.833	17.9
No of projects sanctioned	5	1
Total grant outlay	174.07 Lakhs	45 Lakhs
No of patents filed / granted	2	3
No of book chapters	10	7
MoUs (International / National)	1	-
Number of Ph.D's completed	21	20

Total number of research publications:
(April to June 2023)



Nano Energy

(Impact factor : 17.9)

ACADEMICS

SCI-CONNECT 2023

At the end of each academic year, the School of Basic Sciences renders an exclusive opportunity for all final year students to showcase their research progress in the event Sci-Connect. Sci-Connect 2023 was conducted on 05 April, 2023 by the School of Basic Sciences. In this programme, all the final year UG and PG students of the Departments of Maths, Physics and Chemistry Sciences presented the findings of their final year research projects.

Release of Sci - Connect 2023 abstract book

Project presentation at Sci-Connect 2023

SCI-CONNECT 2023

The names of the winners for best presentation award

Programme	Names
III B.Sc Mathematics	Shanchai Kajenthan (RA2031009010001) Sakthi Priya V. (RA2031009010005)
III B.Sc Physics	Sanjai Balaji D. S. (RA2031010010001) Shashank Srivastava (RA2031010010016)
III B.Sc Chemistry	Khyati Sarma (RA2031011010015) Anitha K. (RA2031011010010)
II M.Sc Mathematics	Pooja J. (RA2132005010006) Richard Christ (RA2132005010023) Gokulakrishnan Ayyappan (RA2132005010037)
II M.Sc Physics	Venkatesh G. (RA2132006010001) B. Kesawarthini (RA2132006010007) Yazhini Pottramarai S. (RA2132006010020)
II M.Sc Atmospheric Science	Athira Baby (RA2132015010005) Akansha Maity (RA2132015010007)
II M.Sc Chemistry	Gopi P. (RA2132008010011) Shobitha Viswanath IK (RA2132008010021) Indhu Mathy N. (RA2132008010033)
II M.Sc Organic Chemistry	Mannepalli Rukmini Sharma (RA2132009010004) Pasupuleti Ravikumar (RA2132009010013) Harshini Ravichandran (RA2132009010009)

SCI-MEET 2023

Sci-Meet 2023 was held on 06 April, 2023 by the School of Basic Sciences. The programme was intended not only to say good bye to the final year UG and PG students of the School of Basics Sciences but also to appreciate their achievements in various fields including academic performance in the college, national level exams, and extra curricular activities such as dance, sports, business development, etc.. Students across the departments, namely – Department of Mathematics, Department of Physics and Nanotechnology, and Department of Chemistry participated in this event. The chief guest Dr. M. Logaraj, Associate Dean (Quality Assurance), Professor Community Medicine, SRM Medical College, SRMIST delivered an inspirational talk by narrating his life experiences throughout his career which inspired the students.

Release of newsletter Horizon issue 1 (vol 2) on 6.4.2023.

Felicitating the chief guest of Sci-Meet 2023

A student receives award at Sci-Meet 2023

Students performing at Sci-Meet 2023

The name of the "rank holders" and "notable performers"

Programme	Names
III B.Sc Mathematics	1st Vivek Sivaramakishnan (RA2031009010012 2nd Shanchai Kajenthan (RA2031009010001)
III B.Sc Physics	1st Chitresh Gehloth (RA2031010010018) 2nd Aditi Javali (Ra2031010010019)
III B.Sc Chemistry	1st Khyati Sarma (RA2031011010015) 2nd T Divya Dharshini (RA2031011010004)
II M.Sc Mathematics	1st Sukanya Dey (RA2132005010044) 2nd Nimrah Ashai (RA2132005010010)
II M.Sc Physics	1st B. Kesawarthini (RA2132006010007) 2nd Yazhini Pottramarai S (RA2132006010020)
II M.Sc Atmospheric Science	1st Akansha Maity (RA2132015010007) 2nd Krishnendu E (RA2132015010009)
II M.Sc Chemistry	1st Monishaa. N (RA2132008010006) 2nd Krishnakumar R(RA2132008010005)
II M.Sc Organic Chemistry	1st Harshini Ravichandran(RA2132009010009) 2nd Rajalakshmi J (RA2132009010002)
III B.Sc Mathematics	Sakthi Priya V (RA2031009010005) for (i) **First class with distinction in Bharathanatyam** (Annamalai University) (ii) **Noble World Records**: 1000 Hands Dance Festival 2022, SK Natya Kala niketan Academy, 25th Anniversary Grand Celebration (record: 9 minutes, 40 seconds) Vivek Sivaramakrishnan(RA2031009010012) for (i) Selected as **the one of 6 candidates** to represent SRM IST for The British Council " **Going Global " Summer School at IITKGP** (National Level) (ii) **Gold Medal** for presenting paper at the Computation intelligence department on Research Day 2023 (iii) **Runner's up** position in Data for Social Good Hackathon, Government of Telangana Shanchai Kajenthan (RA2031009010001) **Excellence Award** in the National Leadership Summit 2023 Avantika (RA2031009010006) NCC: - **B certificate** under NCC directorate under the authority of Ministry of Defense, India Khyati Sarma (RA2031011010015) for Securing **All India Rank 549** in JAM examination 2023
III B.Sc Chemistry	Anusha (RA2031011010002) for Bharathanatyam, **Excellent grade** in Salangai Pooja level

Stress Management for Research Scholars and Supervisors

School of Basic Sciences, College of Engineering and Technology, SRMIST, Kattankulathur campus organized a special talk entitled "Stress Management for Research Scholars and Supervisors" on 12th May 2023. The lecture objectives were (1) to motivate Ph.D. scholars to cope with stress related aspects and successfully complete their degree (2) to inspire faculty members to embrace their journey as supervisors. In the first session, the chief guest Dr. Nappinnai Seran, Consultant Psychologist, Psyhub Brain and Behaviour Clinic addressed the scholars about the origin of stress namely procrastination, social pressure, and fixed frame mindset. She explained how these factors create hurdle in alleviating stress among scholars and the consequences. As a solution, she emphasised building strong interpersonal relationships with supervisor and fellow researchers, maintaining schedule and commitments, create short term and long term goal and manage expectations. In the second session, the speaker (1) inspired faculty members to become role model for researchers, (2) promoting "academic marriage" so that both the supervisor and research scholars understand their respective roles, duties, and work on the betterment of each other and (3) timely completing commitments given to the scholars and keep a close track on their progresses.

Academics - Chemistry

QS world ranking 501 - 550 by subject
Asian university ranking 351 - 400, 9th position among Indian universities and 2nd under the private institutes.

Awards / recognitions / honors received:
Student Achievements

The following students were are selected for Inspire fellowship scheme:

Ms. H K Sanjana (M.Sc. Chemistry, 2020-2022 batch) was selected under **DST-Inspire** fellowship scheme and joining at IIT Madras.

Mr. Kaustuv Chatterjee (M.Sc. Chemistry, 2019-2021 batch) was selected under **DST-Inspire** fellowship scheme and joining at CSIR-CGCRI

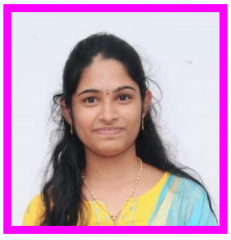
TEEP: The following students were selected for TEEP program:

Mr. G.Muthukumar (Reg. No. RC2133003011018), Research Scholar, 2021 batch received Short-Term Research Internship to Taiwan under Dr. Vinoth Kumar, Associate Professor and Research Faculty at Kaohsiung Medical University (KMU), Taiwan through Taiwan Experience Education Program (TEEP).

Mr Pasupuleti Ravi Kumar (RA2132009010013) , M.Sc. Organic Chemistry student (2021-2023 batch) received Short-Term Research Internship to Taiwan under Prof. Wei-Yu Lin at Kaohsiung Medical University (KMU), Taiwan throughTaiwan Experience Education Program (TEEP).

Gandikota Durga Pavan Kumar (RA2132009010011), M.Sc. Organic Chemistry student (2021-2023 batch) received Short-Term Research Internship to Taiwan under Prof. Tzu-Pin Wang at Kaohsiung Medical University (KMU), Taiwan through Taiwan Experience Education Program (TEEP).

Makesh Murali Krishna K (RA2132008010022), M.Sc. Chemistry student (2021-2023 batch) received Short-Term Research Internship to Taiwan under Prof.Tzu-Pin Wang at Kaohsiung Medical University (KMU), Taiwan through Taiwan Experience Education Program (TEEP).



Srilatha (RA2132009010018), M.Sc. Organic Chemistry student (2021-2023 batch) received Short-Term Research Internship to Taiwan under Prof.Tzu-Pin Wang at Kaohsiung Medical University (KMU), Taiwan through Taiwan Experience Education Program (TEEP).

CHEMISTRY ASSOCIATION EVENT

Department of Chemistry, SRMIST, Kattankulathur campus organized a lecture on **"Tips for preparing CSIR-UGC NET"** under the ``CHEMISTRY ASSOCIATION EVENT`` on 29th April 2023. The speaker of the event is **Dr. Jayanta Samanta**, Research Assistant Professor, Department of Chemistry, SRMIST.

Electrochemistry Summer School – 2023 (ESS – 2023)

Electrochemistry Summer School – 2023 (ESS -2023) was held at SRMIST, Kattankulathur on the 8th and the 9th of June 2023. The event was convened by Dr. M. Arthanareeswari, Prof. and Head of Chemistry and co-convened by Dr. Anantharaj Sengeni, Tutor of ESS – 2023 and Research Assistant Professor of Chemistry with the help of Dr. Dipankar Das, Dr. Sekar Karthikeyan, and Dr. S. Vadivel who acted as coordinators of ESS – 2023. The event was a great success with participants from various reputed institutions like ICT Mumbai, IIT Madras, ARCI Hyderabad, JNCASR Bengaluru, NIT Puducherry, etc.,

SCI-CONNECT 2023

II M.Sc. Chemistry

II M.Sc. Organic Chemistry

III B.Sc. Chemistry

Academics - Mathematics

Dr. K. Ganesan, Professor, represented SRMIST at EduData Summit 2023, **San Francisco, USA.**

Dr. Debabrata Datta, visited SRMIST from 17th to 20th May 2023.

Dr. Swaraj Paul, Research Assistant Professor, gave a special talk on Application of Fourier Transform in the theory of PDE during the **Research Colloquium** 09-05-2023

A **Skill Development Workshop** on **MATHEMATICA** as Teaching and Research Aid was held on 18-05-23

Student Achievements

Mr. John Kaspar, Ph.D. Research Scholar has been offered the post of Assistant Professor at CHRIST (Deemed to be University), Bengaluru.

Mr. Jinse Jacob, Ph.D. Research Scholar has been offered the post of Assistant Professor at Govinda Pai Memorial Government College, Kasargod, Kerala.

Mr. Shanchai Kajenthan, III B.Sc., Mathematics student has been offered the position of Wise President, Operations and Intenational relations **@ AIESEC, Mumbai.**

Ms. Dharmika chowdary, II M.Sc., Mathematics student has been accepted to do her Master of Science Program @ **University of Cinciannati, Ohio, USA**.

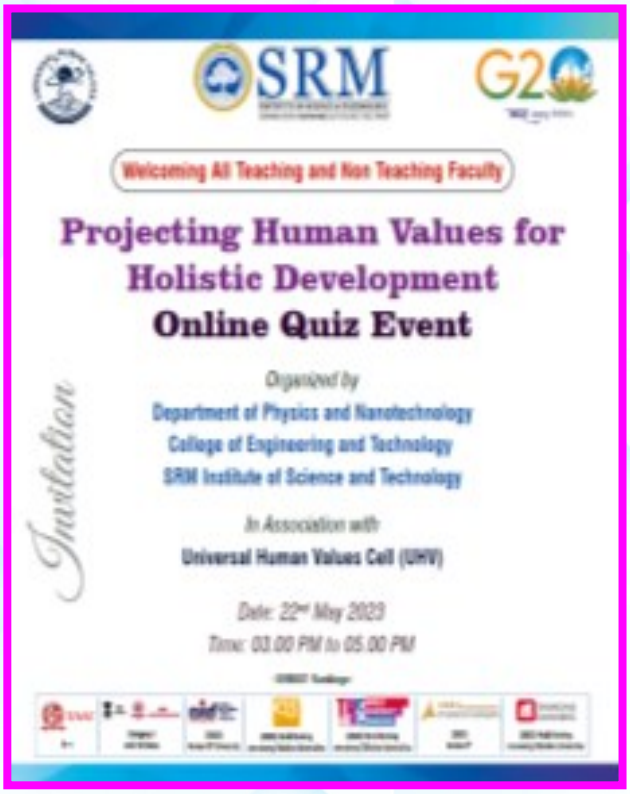
Mr. Vivek Sivaramakrishnan, III B.Sc, Mathematics student was offered the (internship) post of **Teaching Assistant** for the course on Machine Learning Techniques @ **IIT Madras**, since June 2023.

Mr. Kavikaran K., II M.Sc., Mathematics student has been offered the position of Software Engineer @ **Data Vortex LLC.**

Academics - Physics and Nanotechnology

A scientific talk was delivered by Prof. Gautam Bhattacharyya, Director and Senior Professor, Saha Institute of Nuclear Physics, DAE, Govt of India

Farewell day, School of Basic Sciences



Human Values - Online Quiz

Academics - Physics and Nanotechnology

Department's stall in Product Expo 23

Academic performers:

III B.Sc. Physics - 1st place: R. Chitresh Gehloth, 2nd place: Aditi Javali ;
II M.Sc. Physics - 1st place: B. Kesawarthini, 2nd place: Yazhini Pottramarai S;
II M.Sc. Atmospheric Science -1st place: Akansha Maity, 2nd place: Krishnendu E

Value added courses:

PYV0701T Climate Change and Development by by Dr. T.V. Lakshmi Kumar and Dr. A. Naga Rajesh
PYV0702T Physics of Earth's Materials by Dr. Rohit Dhir &Dr. Debabrata Sarkar
PYV0703T Data handling using Python programming by Dr. Rudra Banerjee

Techknow: I-B.Tech Miniproject Presentation

Feynmann Fuzion: B. Tech and M. Tech Project Presentation

ACCMS Global Research Center SRMIST - Webinars (3)

Research—Chemistry

Number of Journal publications : **68**
Average Impact Factor : **5.8**
Highest Impact Factor Journal published **: 17.9**

Highest impact factor paper: **Sengeni Anantharaj** and Suguru Noda. Electrochemical dealloying-assisted activity enhancement: The next big thing in water electrosplitting, Nano Energy, 114, 2023, 108624. **(Impact factor = 17.9).**

Nature indexed Publications (3):

M. Iqbal Bakti Utama, Hongfei Zeng, **Tumpa Sadhukhan**, Anushka Dasgupta, S. Carin Gavin, Riddhi Ananth, Dmitry Lebedev, Wei Wang, Jia-Shiang Chen, Kenji Watanabe, Takashi Taniguchi, Tobin J. Marks, Xuedan Ma, Emily A. Weiss, George C. Schatz, Nathaniel P. Stern and Mark C. Hersam. Chemomechanical modification of quantum emission in monolayer WSe2, Nature Communications, 14, 2023. **(Impact Factor = 17.6)**

Swetha Sathyendran , Kesavan Muthu , Karthick Govindan , Nian-Qi Chen , Wei-Yu Lin , **Gopal Chandru Senadi**. FeCl3-Catalyzed Decyanative [4 + 2] Annulation of α-Aminonitriles with Alkynes: Access to 2,4-Diaryl Quinolines in Batch and Continuous-Flow Processes, Organic Letters, 25, 2023, 4086–4091. **(Impact Factor = 6.07)**

Abigail Jennifer G, Yang Gao, Georg Schreckenbach, **Elumalai Varathan**, Periodic Trends in the Stabilization of Actinyls in Their Higher Oxidation States Using Pyrrophen Ligands,Inorganic Chemistry, 2023,62(18), 6920-6933. **(Impact Factor = 5.436)**

Number of Book chapters published: 6

Patents - Published : (2)
K. K. R Datta. Hydrophobic and superoleophilic material and a process for its preparation (Indian Patent).
R. Arulmozhi. Nanofluidic delivery system for targeted drug delivery (Indian Patent).

Total number of Ph.D. completed: 8

Research—Mathematics

Number of Journal publications : **52**

Average Impact Factor : **2.86**

Highest Impact Factor Journal published **: 12.253**

Highest impact factor papers :

Rupak Datta and Y. H. Joo, "Fuzzy Memory Sampled-Data Controller Design for PMSG-Based WECS With Stochastic Packet Dropouts," in IEEE Transactions on Fuzzy Systems, doi: https://doi.org/10.1109/TFUZZ.2023.3285589. **(Impact factor = 12.253).**

Patents - Published : 1

Dr. V. Muthukumaran, IoT-driven Automatic Rural Road Centerline Detection and Extraction from Aerial Images for Forest Fire Decision Support, Published: 16 June 2023.

Total number of Ph.D. Completed: 1

Awards/ recognitions / honors received:

On behalf of SRMIST, **Dr. K. Ganesan,** Professor, Department of Mathematics, SRMIST, participated in the Edudata Summit 2023.
Dr. Rithesh Kumar Dubey, Research Associate Professor, was member of the Advisory Committee in the International Conference on Differential Equation and Control Problems at IIT Mandi in June 2023.
Dr. Rithesh Kumar Dubey, Research Associate Professor, delivered an Invited Talk in International Conference on Differential Equation and Control Problems at IIT Mandi in June 2023.
Dr. R. Senthamarai, Associate Professor, was awarded the C V Raman Prize and Resarch Excellence Award by the Institute of Researchers, Kerala on 25-05-2023.
Dr. R. Senthamarai, Associate Professor, was awarded the Outstanding Faculty Award by the Ramco Academic Awards, Vellore, Tamil Nadu in May 2023.
Dr. R. Varadharajan, Chief Guest, Webinar on Data Analytics with Regression Models, Muthayammal College of Arts and Science, Rasipuram, Tamil Nadu.
Dr. E. Suresh, delivered an Invited Talk in "A Five-Day Online FDP on Discrete Mathematics" 13th June – 17th June 2023, VIT Vellore campus.
Dr. E. Suresh, delivered an Invited Talk in "Recent Trends in Graph Theory and Mathematical Modeling & its Applications" 12th June – 16th June 2023, Mohamed Sathak AJ College of Engineering, Chennai.

PDF-Visit to premier institutions

Dr. Sahadeb Kuila has been offered Research Associate Fellowship at IIT Kharagpur.
Dr. Sourav Mondal has been offered Post-Doctoral Fellowship at Sungkyunkwan University, South Korea.
Dr. Subhankar Sil has been offered Post-Doctoral Fellowship at the University of British Columbia, Canada.
Dr. V. Subburayan visited IIT Guwahati for Research Collaboration under DST TARE Scheme during April - May 2023.
Dr. Ritesh Kumar Dubey visited IIT Mandi for Research Collaboration in June 2023.
Dr. Swaraj Paul visited TIFR for Research Collaboration in June 2023.
Dr. D. K. Sheena Christy delivered an Invited Talk on Recent Advances in Formal Languages and Automata at D.B. Jain College, Chennai.

Research—Physics and Nanotechnology

Number of Journal publications : **63**
Average Impact Factor : **4.44**
Highest Impact Factor Journal published : **9.8**

Highest impact factor papers:

Mehta, S. K., Ananthavel, A., V. Velu, T. Prabhakaran, G. Pandithurai and D. N. Rao, Vertical distributions and columnar properties of the aerosols during different seasons over Kattankulathur (12.82oN, 80.04oE): A semi -urban tropical coastal station Science of The Total Environment, 886, 1639172023, **(Impact Factor = 9.8)**

Tharani Selvam, Durgalakshmi Dhinasekaran, Balakumar Subramanian, and **R. Ajay Rakkesh**, Layered Structures of Enriched V5+ States of Vanadium Oxide as a Hybrid Cathode Material for Long-Cyclable Aqueous Zinc-Ion Batteries ACS Applied Materials and Interfaces, 15, 30350–30359 (2023), **(Impact Factor = 9.5)**

Nature Indexed journal publications (2):

V. Vijay, **S. Harish, J. Archana and M. Navaneethan**, Ultra-high power factor of p-type Bi2Se3 for room-temperature thermoelectric applications Chemical Communication, 59, 8119-8122 (2023), **(Impact Factor = 4.9)**

S Udhayakumar, George Vasanthan, J Arout Chelvane, **K Kamala Bharathi**, Energy harvesting using linear type magnetostrictive transducer for real-time application Applied Physics Letters, 122, 232406 (2023), **(Impact Factor = 4)**

Number of Book chapters published: 1

Research Projects :
Total number of new grants received : 1 (approved only , sanction yet to come)
Total outlay of the above mentioned project **:** 45 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.Kiran Mangalampalli	Exploring novel ternerary metal nitride system for realizing efficient hightemperature UT and AE sensors	STARS - MHRD	45	2023-2026

New facilities added :
Hexadata Pedestal GPU Workstation (Funding Source: DST – SERB) - Dr. Arijit Sen
Glove Box (Funding Source: DST – SERB) - Dr. Kamala Bharathi
Battery Cycler (Funding Source: DST – SERB) - Dr. Kamala Bharathi
Glove box (Funding Source: DST – SERB) - Dr. K. Arul varman

Number of Ph.Ds completed : 11

Awards/ recognitions / honors received:

Faculty members

Dr. Abhay Abhimanyu Sagade, and Dr. K Shadak Alee:

SERB International Research Experience (SIRE) fellowship for the year 2023-2024

Dr. Saurabh Ghosh

Invited talk in 6TH WORKSHOP ON COMPLEX OXIDES SPETSES, Greece.

Research work in news: News portal of Oak Ridge National Laboratory, DOE, USA.

Ph.D. students

Mr. Abimannan Sethurajaperumal:

International Travel Support Award from DST -SERB & Researcher Development and Travel Grant from Royal Society of Chemistry (£500) for IUMRS-ICAM-ICMAT- 2023, Singapore.

First prize (Rs.10,000 and IEEE membership) in RESEARCH SLAM organized by SRM and IEEE.

Ms. B. Priyanka:

Grant from IEEE magnetic society (900 Euros) for attending their Summer School in Italy.

Mr. Hari Prasanth Perumal:

International Travel Support Award from DST-SERB, for IEEE INTERMAG 2023, Japan.

Ms. Brahmari:

Taiwan Experience Educational Program - 6 months internship at Taipei University of Technology, Taiwan.

Faculty Corner

MATRIX DECOMPOSITIONS AND DEEP LEARNING

The multiplicative decomposition of a matrix into two or more matrices is known as matrix factorization. Examples of such decompositions are LU, QR and SVD decompositions. It is a powerful technique that captures the underlying structure of the given data and has been widely used in feature engineering to learn latent representations of data in various fields like recommender systems, signal processing, computer vision and other applications. Matrix factorization can be a complex problem, particularly when dealing with large-scale and high-dimensional data that have sparse features. Traditional matrix factorization methods often face challenges such as overfitting, data sparsity, and scalability, which can lead to poor performance and limit their applicability.

Recent research advances demonstrate the potential of deep learning in improving the accuracy and scalability of matrix factorization. Deep learning-based matrix factorization methods leverage the power of neural networks to learn the underlying structure of the data and generate more accurate factorization results. These methods have been shown to be particularly effective in handling large-scale and high-dimensional data, and learning from the sparsity of the data to improve the accuracy of the factorization.

Some of the impressive appraoches in deep learning-based matrix factorization are: DeepFactor which combines deep neural networks with traditional matrix factorization methods for preference prediction, Graph convolutional matrix completion uses graph convolutional networks to denoise the input data, Universal Recommender Embeddings (RME) from multi-modal data uses universal embeddings which improve the accuracy of factorization by capturing more of the underlying structure in the data.

These advancements in deep learning-based matrix factorization clearly show great promise in overcoming the limitations of traditional methods. It also demonstrates the potential of deep learning to improve matrix factorizations which makes it a compelling research direction for the future.

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A LIFE-GIVING INTERSTELLAR CARBON MOLECULE

The life that is known to all of us is carbon-based in essence and any firm sign that we can get in interstellar exoplanets could just possibly be the best that mankind has ever done. Living organisms known to man are made up of complex carbon compounds featuring heteroatoms such as N, O, and S with some minerals. With the current advancements we have made in science and technology, we are now able to reach beyond what our ancestors could. If something is to be named as the most significant advancement that mankind recently made, it would be the launch of NASA's James Webb Space Telescope (JWST). The ultrasensitive spectroscopic sensors that JWST has now given us an interstellar eye for searching life-giving carbon molecules.

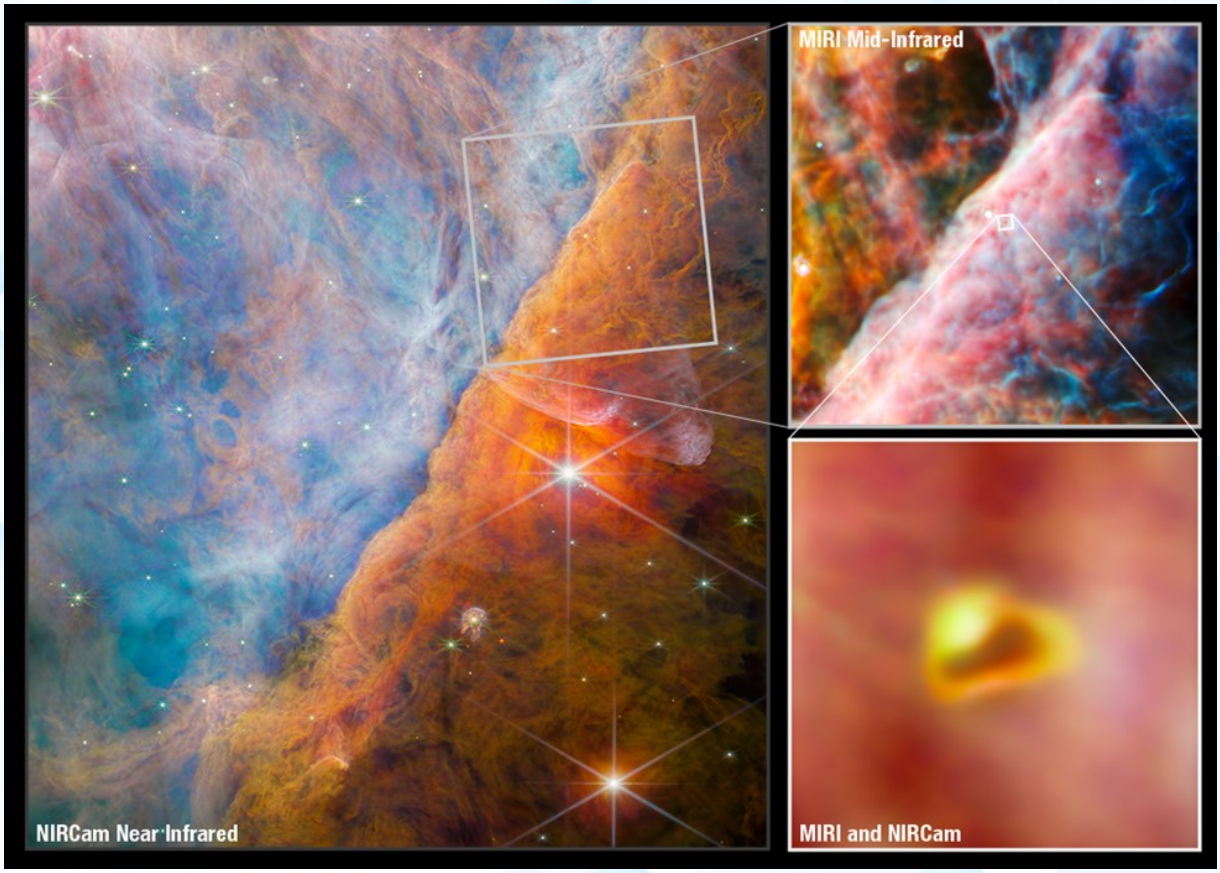

Figure: NIR camera images of ORION nebula with the belt in which the protoplanetary disk in which CH_3^+ is detected for the first-ever time is shown.

One such key discovery is the first-ever detection of methyl cation (CH_3^+) in a protoplanetary disk (a planet in the making) in the ORION nebula by JWST (See the Figure). The molecular spectroscopic tool in JWST has detected highly specific and unique spectral lines that can only be assigned to CH_3^+. Methyl cation is one of the most reactive intermediates encountered in many organic conversions and often plays a central role in the total synthesis of many complex carbohydrates, peptides, and nucleotides. Besides these, it can also do much more. All these complex carbon compounds are what serve as the basic building blocks of all the life forms known to mankind. Hence, the detection of this methyl cation in interstellar space finds its importance more than anything currently. The protoplanetary disk in which it was found is named d203-506 and is 1350 light years away from the earth (freeze in awe as you get amazed by the might of JWST). This disk is currently revolving around a red dwarf but is also being bombarded by intense UV radiations from the nearby hot and gigantic stars. While intense UV destroys most of the carbon molecules into radicals, ions, and radical ions, the existence of CH_3^+ under such high UV irradiation has puzzled the researchers who detected it for the very first time.

It is also speculated that such high and intense UV radiation could actually be the source of energy for forming such a highly reactive and short-lived methyl cation. Though the protoplanetary disk that harbors CH_3^+ is not a planet yet and the life form that may emerge from this could take millions of years from now to form, this single discovery will mark its importance in all the breakthrough discoveries that mankind is yet to make in days to come. The study and the results are published recently in the journal *Nature*.[1]

[1] Berné, O., Martin-Drumel, MA., Schroetter, I. *et al.* Formation of the Methyl Cation by Photochemistry in a Protoplanetary Disk. ***Nature*** (2023). https://doi.org/10.1038/s41586-023-06307-x

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Student Corner

MY VISIT TO THE SAGAR NIDHI VESSEL

My name is Kaveyan and I am a second-year M.Sc. Atmospheric Science student at SRM Institute of Science and Technology in Kattankulathur. I am writing this regarding my recent visit to "SAGAR NIDHI", a Ocean Research Vessel of Indian National Centre for Ocean Information Services (INCOIS), Govt of India. SAGAR NIDHI is a research/survey vessel (ship) that was built in 2006 and sails under the Indian flag. Its deadweight tonnage carrying capacity is 3250 t, and its current draught is reported to be 4.6 meters. Its overall length (LOA) is 103.78 meters and she is 18.26 meters wide.

On June 24, 2023, I visited the vessel with Dr.T.V. Lakshmi Kumar and the atmospheric research team of SRM. The Sagar Nidhi is for exhibition at Chennai Port. From the visit, I was able to gain more knowledge on the ocean vessel and instruments used for ocean and atmospheric-related research. INCOIS scientists designed and deployed the Autonomous Salinity and Temperature Profiling Floats (ARGO) at ten different locations during the cruise. These floats dive to a depth of 2000 meters and then change their buoyancy to rise to the sea surface in accordance with the scientist's research requirements for a number of cycles every day.

The ATLAS buoy system, which was developed to measure upper ocean heat content and surface meteorological parameters in support of air-sea interaction studies in the eastern equatorial Pacific region, is another important ocean measurement instrument deployed by the SAGAR NIDHI. Furthermore, the Automatic Weather Station (AWS) available on the vessel gives atmospheric-sounding data throughout the path of the vessel in the ocean for the research community.

The researchers of INCOIS and National Institute of Ocean Technology (NIOT), and ship officers explained and demonstrated the features of the instruments and their significance to us. We are able to observe and comprehend the deployment and operation of the aforementioned instruments. During my visit, I have also interacted with Dr. E. Pattabhi Rama Rao, Group Director, ODICT, INCOIS. Overall, the visit was very useful for me in terms of learning. I would like to thank INCOIS, NIOT for organizing this event and Dr. Lakshmi Kumar sir for making this opportunity available to us.

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Notifications & Announcements